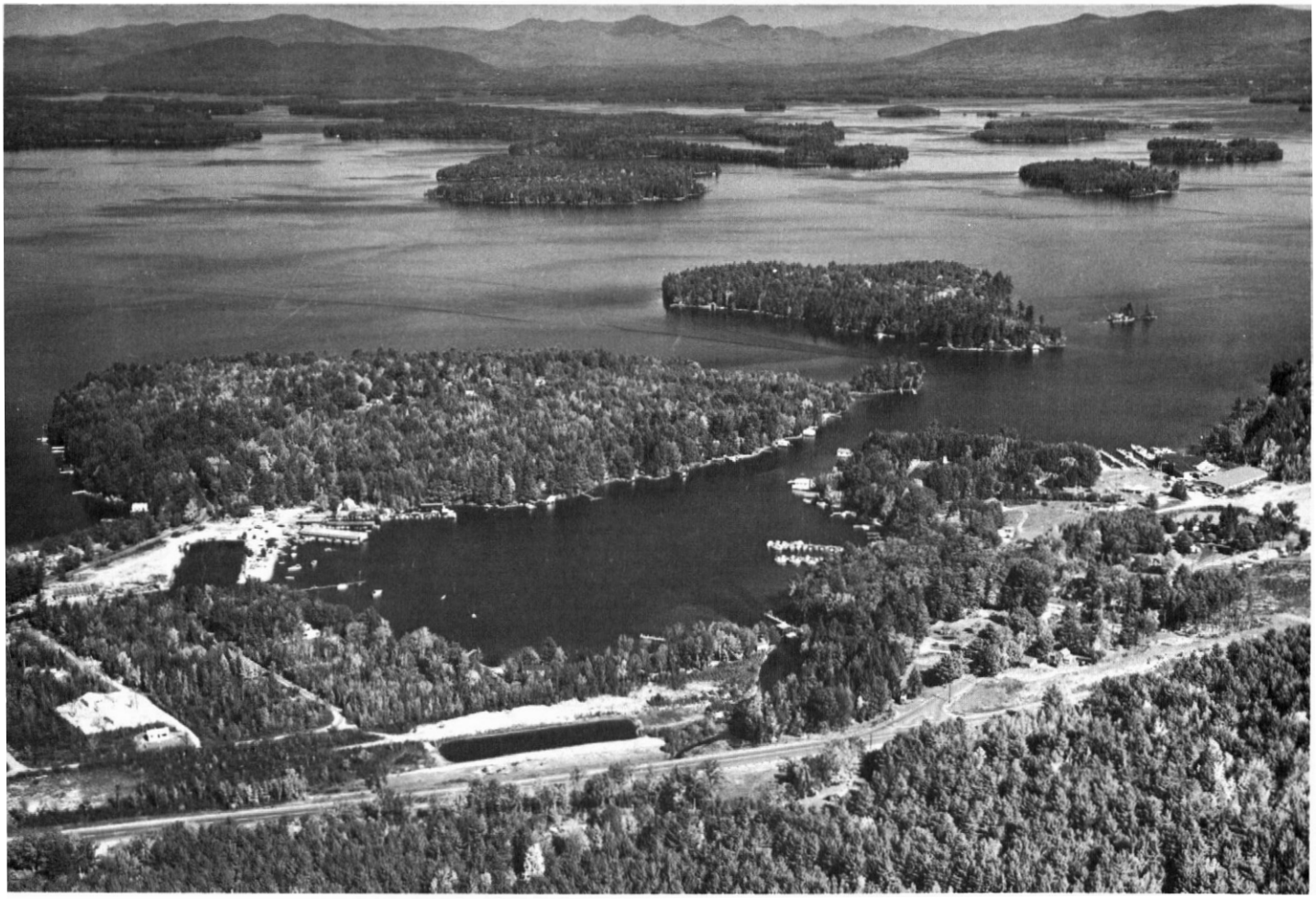
SOIL SURVEY

Belknap County New Hampshire



UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
NEW HAMPSHIRE AGRICULTURAL EXPERIMENT STATION

Issued November 1968

Major fieldwork for this soil survey was done in the period 1956–1964. Soil names and descriptions were approved in 1965. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1964. This survey was made cooperatively by the Soil Conservation Service and the New Hampshire Agricultural Experiment Station; it is part of the technical assistance furnished to the Belknap County Soil Conservation District.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY of Belknap County contains information that can be applied in managing farms and woodlands; in selecting sites for roads, ponds, buildings, or other structures; and in appraising the value of tracts of land for agriculture, industry, or recreation.

Locating Soils

All of the soils of Belknap County are shown on the detailed map at the back of this survey. This map consists of many sheets that are made from aerial photographs. Each sheet is numbered to correspond with numbers shown on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbol. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information in the survey. This guide lists all of the soils of the county in alphabetic order by map symbol. It shows the page where each soil is described, and also the page for the capability unit in which the soil has been placed.

Individual colored maps showing the relative suitability or limitations of the soils for many specific purposes can be developed by using the soil map and information in the text. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils from the soil descriptions and from the discussions of the capability units.

Foresters and others can refer to the section "Soils in Woodland Management," where the soils of the county are rated according to their suitability for trees.

Game managers, sportsmen, and others concerned with wildlife can find information about soils and wildlife in the section "Soils in Wildlife Management."

Community planners and others concerned with community development can read about the soil properties that affect the choice of homesites, industrial sites, schools, and parks in the sections "Soils in Community Development" and "Soils in Recreational Development."

Engineers and builders can find under "Soils in Engineering" tables that give facts about engineering properties of the soils in the county and that name soil features that affect engineering practices and structures.

Scientists and others can read about how the soils were formed and how they are classified in the section "Formation, Morphology, and Classification of the Soils."

Newcomers in Belknap County may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the section "Additional Facts About the County."

Cover picture: Forested shores and islands of Lake Winnipesaukee, an area typical of the county.

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SOIL SURVEY OF BELKNAP COUNTY, NEW HAMPSHIRE

BY THEODORE L. KELSEY AND FRANK J. VIEIRA

FIELDWORK BY HARVEL E. WINKLEY, FRANK J. VIEIRA, THEODORE L. KELSEY, AND DIRK van der VOET, SOIL CONSERVATION SERVICE [1]

UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH NEW HAMPSHIRE AGRICULTURAL EXPERIMENT STATION

BELKNAP COUNTY is in the central part of New Hampshire (fig. 1). The county has a land area of about 400 square miles and a water area of about 67 square miles. It is made up of ten towns and the city of Laconia, which is the county seat.

The soils are mostly rolling to hilly, sandy and stony soils that formed in deep glacial till. The elevation ranges from 320 feet in Sanbornton to 2,378 feet on Belknap Mountain. About 81 percent of the acreage is wooded. Most of this is in privately owned tracts of less than 500 acres.

The main farm products are milk, eggs, fresh fruit, vegetables, and other high-value, perishable items for nearby consumption.

Manufacturing industries and vacation and resort enterprises are the principal sources of income. The county is one of the major recreational and resort areas in the State.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soils are in Belknap County, where they are located, and how they can be used.

They went into the county knowing they likely would find many soils they had already seen and perhaps some they had not. As they traveled over the county, they observed steepness, length, and shape of slopes; size and speed of streams; kinds of native plants and crops; kinds of rocks; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by roots of plants.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and places more distant. They classified and named the soils according to nationwide, uniform procedures. To use this survey efficiently, it is necessary to know the kinds of groupings most used in a local soil classification.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, the major horizons of all the soils of one series are similar in thick-

[1] WILLIAM CARTER and BRADFORD HIGGINS, Soil Conservation Service, also contributed to the fieldwork.

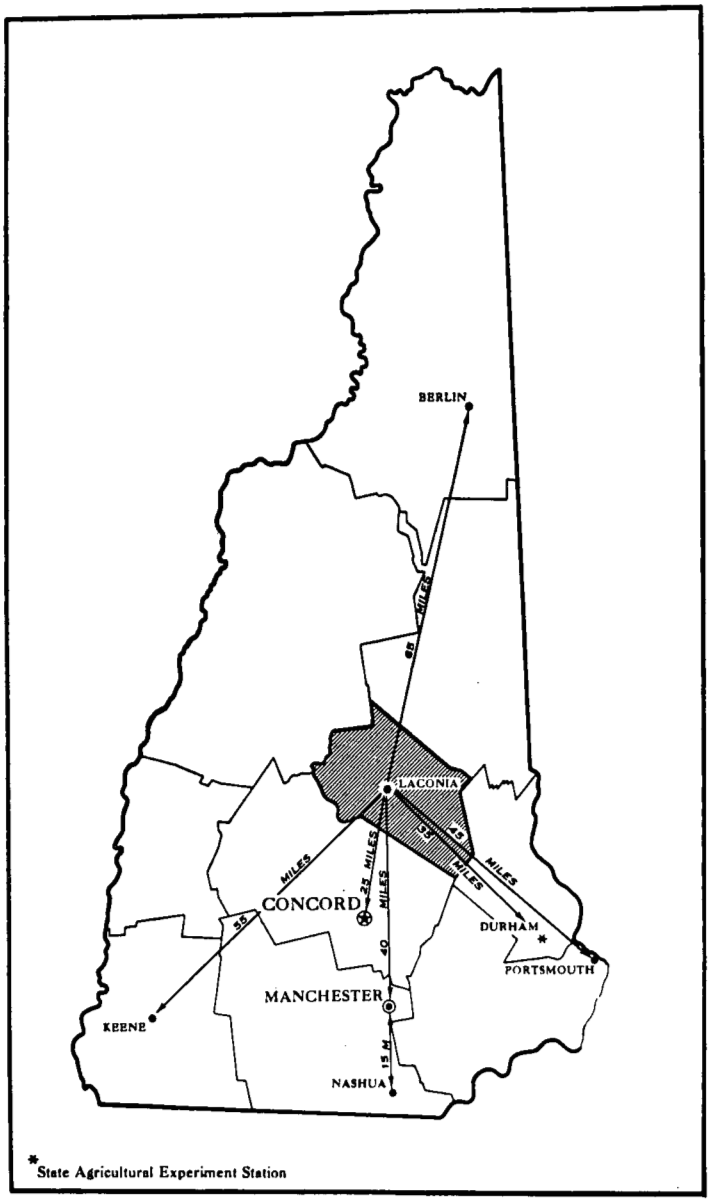

Figure 1.—Location of Belknap County in New Hampshire.

ness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Charlton and Gloucester, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that affect their behavior in the natural, undisturbed landscape. Soils of one series can differ somewhat in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man.

If there are, within a series, differences in texture of the surface layer, separations called soil types are made. For example, Hinckley loamy sand and Hinckley gravelly loamy sand are two soil types in the Hinckley series.

Some soil types vary so much in slope, degree of erosion, number and size of stones, or some other feature affecting their use, that practical suggestions about their management could not be made if they were shown on the soil map as one unit. Such soil types are divided into phases. The name of a soil phase indicates a feature that affects management. For example, Gloucester very stony sandy loam, 3 to 8 percent slopes, is one of several phases of Gloucester sandy loam, a soil type that ranges from gently sloping to very steep and from stone free to extremely stony.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that help in drawing boundaries accurately. The soil map in the back of this publication was prepared from aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning management of farms and fields, a mapping unit is nearly equivalent to a soil type or a phase of a soil type. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil type or soil phase.

In preparing some detailed maps, the soil scientists have a problem of delineating areas where different kinds of soils are so intricately mixed or occur in such small individual tracts that it is not practical to show them separately on the map. They show such a mixture of soils as one mapping unit and call it a soil complex. Ordinarily, a soil complex is named for the major kinds of soils in it, for example, Shapleigh-Gloucester sandy loams.

Another kind of mapping unit is the undifferentiated group, which consists of two or more soils that may occur together without regularity in pattern or relative proportion. The individual tracts of the component soils could be shown separately on the map, but the differences between the soils are so slight that the separation is not important for the objectives of the soil survey. An example is Ridgebury and Whitman very stony loams.

Most surveys include areas where the soil material is so rocky, so shallow, or so frequently worked by wind and water that it cannot be classified by soil series. These areas are shown on a map like other mapping units, but they are given descriptive names, such as Made land or Rock outcrop, and are called land types.

While a soil survey is in progress, samples of soils are taken, as needed, for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soils in other places are assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soils. Yields under defined management are estimated for all the soils.

But only part of a soil survey is done when the soils have been named, described, and delineated on the map and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in such a way that it is readily useful to different groups of readers, among them farmers, ranchers, managers of woodland, engineers, and homeowners. Grouping soils that are similar in suitability for each specified use is the method of organization commonly used in the soil survey. On the basis of the yield and practice tables and other data, the soil scientists set up trial groups. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others; then they adjust them according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under present methods of use and management.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in Belknap County. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of farming or other land use. Such a map is not suitable for planning the management of a farm or field, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect management.

Following are descriptions of the soil associations in this county.

1. Windsor-Hinckley-Au Gres association

Deep, excessively drained and poorly drained, coarse-textured soils that formed in sand and gravel in stream valleys

This association, the smallest in the county, occurs as narrow strips in valleys along rivers and smaller streams. The soils formed in water-sorted sand and gravel on nearly level sand plains and terraces, on small hills, and on steep, narrow ridges and terrace banks. A distinctive feature of the landscape is the absence of stones, boulders, and bedrock outcrops. About 75 percent of the association is forested. The elevation, which is the lowest in the county, ranges from about 300 to 650 feet. The total area is about 10 percent of the county.

Windsor soils make up about 45 percent of this association, Hinckley soils about 40 percent, and Au Gres soils about 5 percent. The remaining 10 percent is made up of Deerfield, Scarboro, Ondawa, Podunk, and Rumney soils and of alluvial land and marsh.

Windsor soils are sandy and excessively drained and contain little or no gravel. Hinckley soils also are sandy and excessively drained but contain much gravel. Au Gres soils, which are in the low places on sand plains, are poorly drained. The minor soils in the association are along streams and are subject to flooding.

Windsor and Hinckley soils were once farmed but are now mostly idle or forested. About 2 or 3 percent of this association is within the Pemigewasset River flood plain, most of which is a water-storage area and is flooded when the dam at Franklin Falls is closed. The area on the west side of Alton Bay is a recreation center.

2. *Gloucester-Shapleigh-Whitman association*

Deep and shallow, somewhat excessively drained, moderately coarse textured soils on gently sloping to steep uplands and very poorly drained, very stony soils in upland depressions

This association is on sandy uplands, mainly in the northwestern part of the county. Scattered throughout the uplands are low, swampy, stony areas and many lakes and ponds. Stones, boulders, and bedrock outcrops are prominent. Forest covers about 85 percent of the area. The elevation ranges from about 500 to 1,500 feet. This association occupies approximately 15 percent of the county.

Gloucester soils make up about 60 percent of the association, Shapleigh soils about 20 percent, Whitman soils about 15 percent, and Acton, Ridgebury, and Charlton soils the remaining 5 percent.

Gloucester soils are deep, moderately coarse textured, and somewhat excessively drained. They are gently sloping to steep. Shapleigh soils are similar to Gloucester soils but are less than 2 feet in depth to granite and schist bedrock. Outcrops of bedrock are common and in places numerous. Whitman soils are wet. They are the loamy, very poorly drained, very stony soils in the upland depressions.

There are several dairy farms in this association, but most of it is unsuitable for general farming because of the small fields and the many stones. As in the rest of the county, recreation is an important land use. Lake Winnipesaukee, the largest lake in New Hampshire, is the center of recreational activities. Squam Lake, Lake Waukewan, Pemigewasset Lake, Wicwas Lake, Meredith Bay, and Center Harbor are all popular summertime recreation centers. Several farms have been converted into recreation enterprises and vacation homes.

3. *Shapleigh-Gloucester association*

Shallow and deep, somewhat excessively drained, moderately coarse textured soils on mountains and islands

Steep, stony, mountainous land and sloping or gently sloping islands make up this association. Nearly all of it is forested. The steepest and rockiest areas of the county are in this association, and there are few roads through them. The largest area borders Lake Winnipesaukee and includes the islands in the lake. Belknap, the highest mountain, rises to an elevation of 2,384 feet. The total area of the association is about 18 percent of the county.

Shapleigh soils make up about 60 percent of the association, Gloucester soils about 30 percent, and the Charlton and Whitman soils 10 percent.

Shapleigh soils are shallow and somewhat droughty. They are underlain by granite or schist bedrock, generally within a depth of 2 feet, and there are many rock outcrops. Gloucester soils are deep and somewhat droughty. They are so stony that one can step from stone to stone.

Steep slopes, stones, and bedrock outcrops limit the use of this association mainly to woodland and wildlife habitat. Most of it is woodland. Second and third growth trees have been heavily cut. Wild, low-bush blueberries are a cash crop around Mount Major.

4. *Paxton-Shapleigh-Woodbridge association*

Deep and shallow, dominantly well drained, medium-textured and moderately coarse textured soils on hilly uplands

Smooth, broad hills called drumlins are typical of this association. The hilltops are gently sloping, as shown in figure 2. Stones and bedrock outcrops are prominent. About 80 percent of the association is forested. The elevation ranges from 500 to 1,500 feet. This association is the largest in the county and occupies about 45 percent of the total acreage.

Paxton soils make up about 60 percent of the association, Shapleigh soils 25 percent, Woodbridge soils 10 percent, and Charlton, Ridgebury, and Gloucester soils 5 percent.

Paxton soils are deep, well drained, and loamy. They have a pan layer at a depth of about 2 feet that restricts root growth. Shapleigh soils are shallow, sandy, and somewhat excessively drained. They are less than 2 feet in depth to bedrock. Woodbridge soils are on the lower side slopes and on ridgetops. They are moderately well drained and loamy. Like Paxton soils, they have a pan layer at a depth of about 2 feet, but they are wetter than Paxton soils and have to be cultivated later in spring.

Most of the farms in the county are in this association. The soils are suitable for apple orchards and for dairy farming, truck gardening, and poultry farming. Paxton soils on the high hilltops are especially well suited to apple orchards. Many farms in the area of Gilmanton are no longer worked. The old fields have reseeded to pure stands of white pine. Farms and country homes in this association are widely separated by woodlots. Several dairy farms have been converted into golf courses. Winnisquam Lake and Weirs Beach on Lake Winnipesaukee are popular vacation centers.

5. *Gloucester-Paxton-Shapleigh association*

Deep and shallow, well-drained and somewhat excessively drained, moderately coarse-textured and medium-textured soils on rolling uplands

This association consists of hilly, rolling soils on uplands marked by stones, boulders, and bedrock outcrops. It occurs throughout the central part of the county, and about 85 percent of it is forested. The elevation ranges from 500 to 1,450 feet. The total area is about 12 percent of the county.

Gloucester soils make up about 70 percent of the association, Paxton soils 10 percent, Shapleigh soils 10 percent, and Acton, Ridgebury, Charlton, and Whitman soils 10 percent.

Gloucester soils are on the hillsides. They are deep, moderately coarse textured, and somewhat excessively drained. Paxton soils are on the smooth hilltops. They are deep, medium-textured, well-drained soils that have a pan layer at a depth of about 2 feet. Between areas of the deep soils are areas of Shapleigh soils, which are shallow, moderately

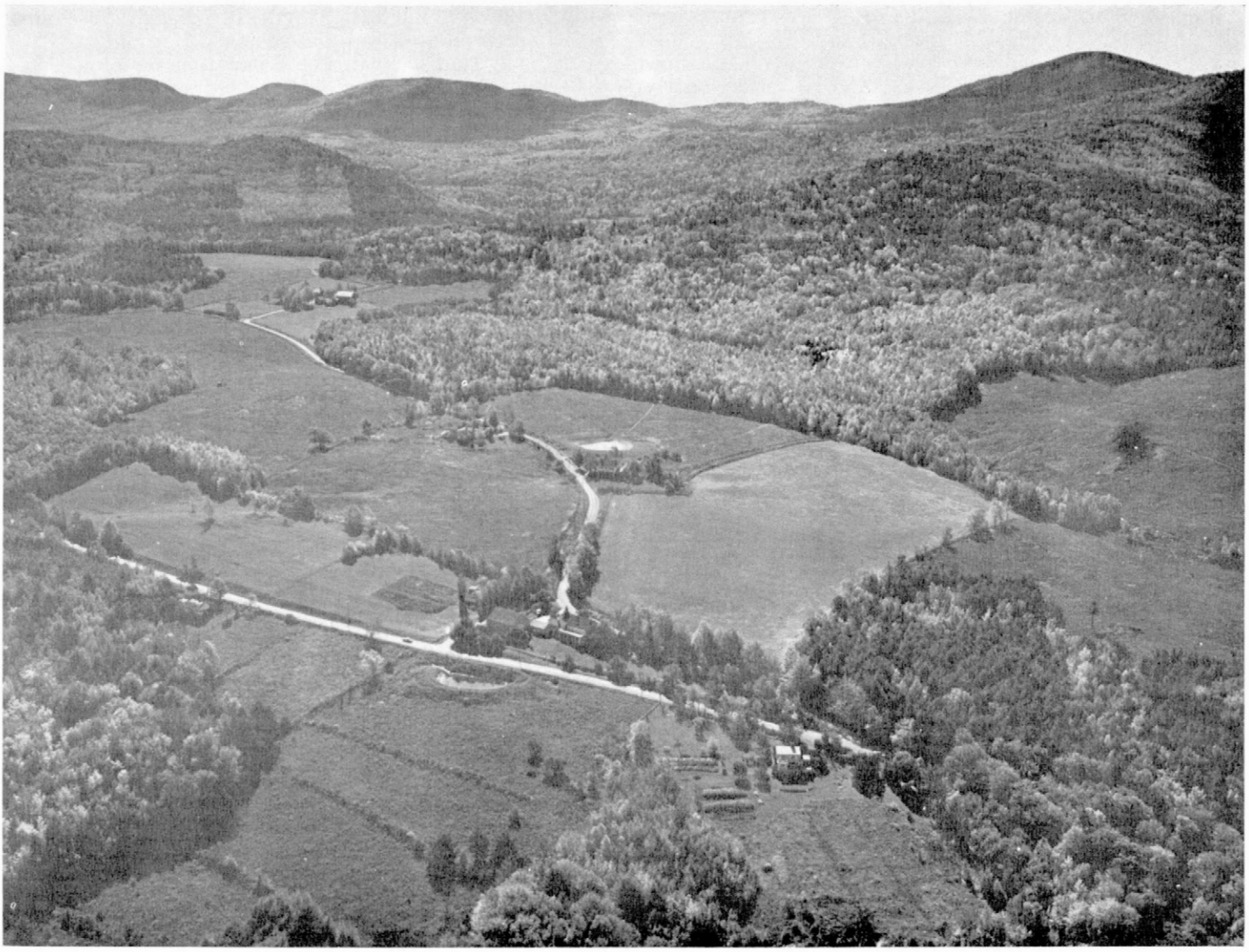

Figure 2.—**The Paxton-Shapleigh-Woodbridge association in the foreground; the mountainous Shapleigh-Gloucester association in the background.**

coarse textured, and somewhat excessively drained. They are underlain by granite or schist bedrock at a depth of less than 2 feet.

Stones and bedrock outcrops limit farming in this association. Wild, low-bush blueberries are a cash crop on Prospect Mountain. Most of the association is used as woodland. Recreation is also an important use. Glendale, on Lake Winnipesaukee, is a recreation center.

Descriptions of the Soils

The soil series and their component mapping units are described in this section. Each series description contains information about the features of the soils and their limitations and suitability for farming and other purposes. For each series a profile of a soil representative of the series is described. The soils are then described individually, and, if they differ from the representative soil in ways that are not obvious from the name, the differences are pointed out. Otherwise they are assumed to be like the representative soil.

Table 1 lists the mapping units and shows their acreage and proportionate extent.

Acton Series

The Acton series consists of deep, moderately well drained, nearly level and gently sloping soils on uplands in the eastern part of the county. These soils formed in sandy and stony glacial till. They are in depressions and on long, gentle foot slopes that receive seepage from higher slopes. Consequently, they are seasonally wet. The trees commonly growing on them are red maple, sugar maple, white pine, hemlock, yellow birch, and white ash.

A cultivated Acton soil typically has a surface layer of dark-brown, granular fine sandy loam about 9 inches thick. The subsoil is yellowish-brown loamy sand to a

TABLE 1.—*Approximate acreage and proportionate extent of the soils*

Soil	Area	Extent	Soil	Area	Extent
	Acres	*Percent*		*Acres*	*Percent*
Acton and Acton firm substratum, fine sandy loams, 0 to 8 percent slopes	1,400	0.5	Paxton loam, 8 to 15 percent slopes	2,300	0.9
Acton and Acton firm substratum, very stony fine sandy loams, 0 to 8 percent slopes	4,800	1.9	Paxton loam, 15 to 25 percent slopes	2,110	.8
Acton and Acton firm substratum, very stony fine sandy loams, 8 to 15 percent slopes	780	.3	Paxton very stony loam, 3 to 8 percent slopes	4,100	1.6
Au Gres loamy sand, 0 to 8 percent slopes	1,500	.6	Paxton very stony loam, 8 to 15 percent slopes	8,230	3.2
Charlton loam, 3 to 8 percent slopes	1,130	.4	Paxton very stony loam, 15 to 25 percent slopes	8,940	3.5
Charlton loam, 8 to 15 percent slopes	1,120	.4	Paxton very stony loam, 25 to 60 percent slopes	990	.4
Charlton loam, 15 to 25 percent slopes	340	.1	Podunk fine sandy loam	220	.1
Charlton very stony loam, 3 to 8 percent slopes	2,500	1.0	Ridgebury loam, 0 to 3 percent slopes	470	.2
Charlton very stony loam, 8 to 15 percent slopes	3,100	1.2	Ridgebury loam, 3 to 8 percent slopes	520	.2
Charlton very stony loam, 15 to 25 percent slopes	2,240	.9	Ridgebury very stony loam, 0 to 3 percent slopes	930	.4
Charlton very stony loam, 25 to 60 percent slopes	790	.3	Ridgebury very stony loam, 3 to 8 percent slopes	890	.3
Charlton extremely stony loam, 8 to 25 percent slopes	1,230	.5	Ridgebury and Whitman very stony loams, 0 to 3 percent slopes	5,040	2.0
Charlton extremely stony loam, 25 to 60 percent slopes	900	.3	Ridgebury and Whitman very stony loams, 3 to 8 percent slopes	2,200	.9
Deerfield loamy sand, 0 to 3 percent slopes	460	.2	Rock outcrop	550	.2
Deerfield loamy sand, 3 to 8 percent slopes	440	.2	Rumney fine sandy loam	560	.2
Gloucester sandy loam, 3 to 8 percent slopes	3,500	1.4	Scarboro fine sandy loam	1,200	.5
Gloucester sandy loam, 8 to 15 percent slopes	3,210	1.2	Shapleigh-Gloucester sandy loams, 3 to 8 percent slopes	2,100	.8
Gloucester sandy loam, 15 to 25 percent slopes	930	.4	Shapleigh-Gloucester sandy loams, 8 to 15 percent slopes	2,500	1.0
Gloucester very stony sandy loam, 3 to 8 percent slopes	10,450	4.1	Shapleigh-Gloucester very rocky sandy loams, 3 to 15 percent slopes	10,450	4.1
Gloucester very stony sandy loam, 8 to 15 percent slopes	16,810	6.6	Shapleigh-Gloucester very rocky sandy loams, 15 to 25 percent slopes	6,810	2.7
Gloucester very stony sandy loam, 15 to 25 percent slopes	8,700	3.4	Shapleigh-Gloucester very rocky sandy loams, 25 to 60 percent slopes	1,200	.5
Gloucester very stony sandy loam, 25 to 60 percent slopes	1,200	.5	Shapleigh-Gloucester extremely rocky sandy loams, 8 to 25 percent slopes	18,052	7.0
Gloucester extremely stony sandy loam, 8 to 25 percent slopes	41,260	16.1	Shapleigh-Gloucester extremely rocky sandy loams, 25 to 60 percent slopes	11,010	4.3
Gloucester extremely stony sandy loam, 25 to 60 percent slopes	4,100	1.6	Suncook loamy sand	140	.1
Gravel and Borrow pits	662	.2	Whitman very stony loam	800	.3
Hinckley gravelly loamy sand, 15 to 60 percent slopes	5,600	2.2	Windsor loamy sand, 0 to 3 percent slopes	2,450	.9
Hinckley loamy sand, 0 to 3 percent slopes	2,490	1.0	Windsor loamy sand, 3 to 8 percent slopes	4,570	1.8
Hinckley loamy sand, 3 to 8 percent slopes	4,150	1.6	Windsor loamy sand, 8 to 15 percent slopes	2,260	.9
Hinckley loamy sand, 8 to 15 percent slopes	2,030	.8	Windsor loamy sand, 15 to 60 percent slopes	2,110	.8
Made land	380	.1	Woodbridge loam, 0 to 8 percent slopes	1,300	.5
Marsh	950	.4	Woodbridge loam, 8 to 15 percent slopes	350	.1
Mixed alluvial land, wet	940	.4	Woodbridge very stony loam, 0 to 8 percent slopes	2,460	1.0
Muck and Peat	8,000	3.1	Woodbridge very stony loam, 8 to 15 percent slopes	900	.3
Ondawa fine sandy loam, high bottom	260	.1			
Paxton loam, 0 to 8 percent slopes	9,000	3.5	Total land area [1]	256,064	100.0

[1] Water area is 42,816 acres.

depth of 18 inches. From there down through the substratum, the color is generally light olive brown to grayish brown, and the texture is gravelly loamy sand. The lower part is mottled with red and yellowish brown as a result of a seasonal high water table.

These soils are generally moderately well drained, but the drainage extends into the upper limit of the somewhat poorly drained class. The depth to the seasonal high water table generally is from 12 to 30 inches, but in dry periods the water table may be at a depth of 6 feet or more. Permeability is rapid below the surface layer.

Acton soils are among the best in the county for woodland, and stone-free areas are well suited to hay crops. Limitations are severe for community development where public sewage systems and water systems are not available. Limitations are slight for most recreation facilities.

Profile of Acton fine sandy loam (slope of 5 percent) in a commercial blueberry field on Prospect Mountain in Alton:

Ap—0 to 9 inches, dark-brown (10YR 3/3) fine sandy loam; weak, fine, granular structure; very friable; many roots; about 2 percent gravel; strongly acid; abrupt, smooth boundary. 7 to 10 inches thick.

B2—9 to 18 inches, yellowish-brown (10YR 5/4) loamy sand; massive; friable; few roots; about 10 percent gravel; few stones; strongly acid; clear, wavy boundary. 8 to 11 inches thick.

B3—18 to 23 inches, light olive-brown (2.5Y 5/4) gravelly loamy sand with few, fine, distinct, yellowish-brown (10YR 5/8) mottles; massive; friable; few roots; 15 to 20 percent gravel; few stones; strongly acid; clear, wavy boundary. 4 to 7 inches thick.

C—23 to 36 inches, grayish-brown (2.5Y 5/2) gravelly loamy sand with many, prominent, coarse, red (2.5YR 4/8) mottles; massive; friable; no roots; 15 to 20 percent gravel; common stones; strongly acid.

The texture of the surface layer is generally fine sandy loam, but in places it is sandy loam. Below a depth of 12 to 14 inches, the content of silt is less than 25 percent, and the texture is loamy coarse sand in places. Coarse fragments generally make up 20 to 60 percent of the soil by volume. The upper B horizon has a hue of 7.5YR or 10YR, a value of 4 to 6, and a chroma of 4 to 6. The lower B horizon has a hue of 10YR or 2.5Y, a value of 4 to 6, and a chroma of 3 to 6. The C horizon has a hue of 10YR to 5Y, a value of 4 to 7, and a chroma of 2 to 7. The depth to distinct mottling ranges from 12 to 30 inches. The consistence of the C horizon is commonly friable or loose. In some places where the structure is massive or weak platy, the consistence is firm or hard if the soil is in place but friable when the soil is removed. The reaction ranges from a very strongly acid to medium acid.

These soils are in a drainage sequence with the somewhat excessively drained Gloucester soils, which are free of mottling in the solum. Others in the sequence are the poorly drained Ridgebury soils and the very poorly drained Whitman soils. Acton soils are similar to Woodbridge soils, but the latter are finer textured and have a pan layer, generally within 2 feet of the surface.

Acton and Acton firm substratum, fine sandy loams, 0 to 8 percent slopes (AcB).—This mapping unit consists of Acton fine sandy loam that has a friable or loose substratum and Acton fine sandy loam that has a firm substratum. Both soils occur in some areas, and in others, only one. These soils are in depressions and on lower side slopes on uplands. There are a few isolated stones on the surface. Included in mapping were areas in which a reddish-brown to yellowish-red layer occurs at a depth of 6 to 10 inches and small areas in which the slope is more than 8 percent.

The downward movement of water is retarded by a seasonal high water table or by a firm substratum. Wetness is the major limitation, and artificial drainage would permit a wider choice of crops. Erosion is a limitation in some gently sloping areas, but these areas are better for crops than the less sloping ones because they have more outlets for drainage. If drained, these soils are suited to corn, oats, hay, and pasture. They make good habitats for openland and woodland wildlife. (Capability unit IIw–52)

Acton and Acton firm substratum, very stony fine sandy loams, 0 to 8 percent slopes (AtB).—These soils generally have a 1-inch to 2-inch cover of leaves or pine needles over 2 to 3 inches of dark-brown, granular fine sandy loam. The subsoil is yellowish-brown loamy sand that contains a few stones 10 to 12 inches across. Red and yellowish-brown mottles generally occur at a depth of 12 to 18 inches. Included in mapping were areas in which a reddish-brown to yellowish-red layer occurs in the upper part of the subsoil, just below a thin, gray, ashlike horizon. In some places these soils are interspersed with poorly drained Ridgebury soils.

The downward movement of water is retarded by a seasonal high water table or by a firm substratum. There are more outlets for drainage in the gently sloping areas than in the level ones. Stones and wetness are the major limitations for crops and for community development. These soils make good habitat for woodland wildlife. (Capability unit VIs–72)

Acton and Acton firm substratum, very stony fine sandy loams, 8 to 15 percent slopes (AtC).—These sloping soils are on long, wooded hillsides. They are deeper to mottling and more uniform in drainage than Acton and Acton firm substratum, very stony fine sandy loams, 0 to 8 percent slopes. A large part of the mapping unit has a firm substratum. Small areas of extremely stony soils and of steeper soils were included in mapping.

Stones and wetness are the major limitations for crops. There are more drainage outlets in these soils than in less sloping Acton soils. These soils make good woodland wildlife habitat. (Capability unit VIs–72)

Au Gres Series

The Au Gres series consists of deep, nearly level, waterlogged soils. These soils occur in the eastern, central, and western parts of the county. The vegetation commonly consists of red maple, hemlock, balsam fir, and white pine.

An Au Gres soil in pasture typically has an 8-inch surface layer of very dark gray, granular loamy sand. Under this is a 3-inch layer of gray, mottled sand. The subsoil consists of a 7-inch layer of dark reddish-brown loamy sand over about 5 inches of grayish-brown and yellowish-red sand. The subsoil is loose when dug with a spade but has hard chunks in the lower part. The substratum is light yellowish-brown, mottled sand. It is saturated with water.

The water table stays near the surface from late in fall till late in spring. Consequently, soil air is limited, the soils warm up slowly in spring, and plant growth is restricted. Permeability is very rapid in the substratum.

Growing grass and legumes is not generally practicable. The limitations are severe for septic tank systems.

Profile of Au Gres loamy sand (slope of 3 percent) in pasture off Route 104, 4 miles northeast of New Hampton village:

Ap—0 to 8 inches, very dark gray (10YR 3/1) loamy sand; weak, medium, granular structure; very friable; many roots; strongly acid; abrupt, smooth boundary. 7 to 10 inches thick.

A2g—8 to 11 inches, gray (10YR 6/1) sand with common, medium, prominent, yellowish-red (5YR 4/8) mottles; massive in place, single grain when removed; very friable; common roots; strongly acid; abrupt, wavy boundary. 1 to 8 inches thick.

B21—11 to 18 inches, dark reddish-brown (5YR 3/3) loamy sand; massive in place, single grain and loose when removed, except for many yellowish-red (5YR 4/6), very firm, cemented aggregates about one-half inch in diameter; common roots; strongly acid; clear, wavy boundary. 6 to 9 inches thick.

B22—18 to 23 inches, grayish-brown (2.5Y 5/2) and yellowish-red (5YR 4/8) medium sand; massive in place, single grain when removed; firm in place, loose when removed, except for some firm, cemented aggregates about one-half inch in diameter; no roots; medium acid; clear, wavy boundary. 2 to 5 inches thick.

C—23 to 36 inches, light yellowish-brown (2.5Y 6/4) medium sand with common, medium, prominent, yellowish-red (5YR 4/8) mottles; massive in place, single grain when removed; firm in place, very friable when removed; medium acid.

The A horizon is generally loamy sand, but in places the content of sand is 85 to 90 percent. The subsoil is loamy sand and medium sand with lenses of coarse sand and fine gravel. The A2 horizon ranges from 1 to 20 inches in thickness and is generally thicker in the more poorly drained areas. A thin layer that is high in organic-matter content occurs below the A2 horizon in some places. Drainage is centered on the poorly drained class but extends into the lower range of the some-

what poorly drained class. Reaction ranges from strongly acid through medium acid.

These soils are in the same drainage sequence with the excessively drained Windsor, the moderately well drained Deerfield, and the very poorly drained Scarboro soils.

Au Gres loamy sand, 0 to 8 percent slopes (AuB).—This soil commonly occupies depressions and gentle lower slopes on sand plains. Included in mapping were some areas of very poorly drained Scarboro soils, some areas without cemented aggregates, some areas that have a continuous cemented subsurface layer, and some that have a finer textured surface layer.

The high water table restricts internal drainage and thereby limits crop production, but crops respond well to artificial drainage. Outlets for drainage systems are generally easier to locate on the gently sloping areas than on the more nearly level sites. The erosion hazard is slight. Some areas can be developed for woodland wildlife. (Capability unit IIIw–23)

Charlton Series

The Charlton series is made up of deep, well-drained, gently sloping to very steep soils that formed in moderately coarse textured glacial till derived mainly from schist. The native vegetation consists mostly of white pine, red oak, and northern hardwoods. Charlton soils are mostly on the very stony, rolling uplands in the southeastern and central parts of the county.

A very stony Charlton soil in a wooded area typically has a thin layer of leaf litter underlain by a layer of light-gray loam about 1 inch thick. The loam is underlain by dark-brown and yellowish-brown fine sandy loam to a depth of 16 inches, and below this is olive and light olive-brown fine sandy loam. The fine sandy loam layers are 2 to 5 percent gravel. A hard layer, if present, is below a depth of about 30 inches. In the substratum there are thin layers of sand that contain as much as 20 percent gravel.

These soils have moderate permeability and a high moisture-holding capacity. The more nearly level, stone-free areas are well suited to many farm and nonfarm uses. The steeper areas have moderate to severe limitations for several recreational uses and for community development.

Profile of Charlton very stony loam (slope of 15 percent) in woods on the eastern shore of Lower Suncook Lake in Barnstead:

O1—1 inch to 0, fresh pine needles and twigs.

A2—0 to 1 inch, light-gray (10YR 7/0) loam; weak, fine, granular structure; very friable; about 2 percent stones larger than 10 inches in diameter; many roots; very strongly acid; abrupt, wavy boundary. ½ to 1 inch thick.

B21—1 inch to 5 inches, dark-brown (7.5YR 4/4) fine sandy loam; weak, fine, granular structure; very friable; many roots; 2 to 5 percent gravel; very strongly acid; gradual, wavy boundary. 3 to 5 inches thick.

B22—5 to 16 inches, yellowish-brown (10YR 5/8) fine sandy loam; weak, very fine, granular structure; very friable; common roots; 2 to 5 percent gravel; very strongly acid; abrupt, wavy boundary. 8 to 15 inches thick.

B23—16 to 22 inches, light olive-brown (2.5Y 5/6) fine sandy loam; weak, fine, granular structure; very friable; few roots; 2 to 5 percent gravel; very strongly acid; abrupt, wavy boundary. 4 to 8 inches thick.

C1—22 to 33 inches, light olive-brown (2.5Y 5/4) fine sandy loam; weak, fine, granular structure; friable; few roots; very strongly acid; abrupt, smooth boundary. 10 to 11 inches thick.

IIC2—33 to 35 inches, light olive-brown (2.5Y 5/6) gravelly sand; single grain; loose; common roots; 20 percent gravel; strongly acid; abrupt, smooth boundary. 2 to 3 inches thick.

IIIC3—35 to 48 inches, olive (5Y 4/3) fine sandy loam; weak, thin, platy structure; friable; few roots; less than 2 percent gravel; strongly acid.

The texture of the A horizon is loam or fine sandy loam. Below a depth of 12 inches, the texture of the B horizon ranges from fine sandy loam to sandy loam; the content of silt is more than 25 percent. The texture of the C horizon ranges from fine sandy loam to loamy sand. Coarse fragments commonly make up 5 to 30 percent of the soil mass. The color of the B horizon is lighter with depth. Hues of 2.5Y and 5Y are dominant in the C horizon. The consistence of this horizon is friable to firm. Reaction ranges from very strongly acid to medium acid.

Charlton soils adjoin Shapleigh, Paxton, and Gloucester soils. They are deeper to bedrock than Shapleigh soils, have a finer textured B horizon than Gloucester soils, and do not have a pan layer such as that occurring at a depth of 20 inches in Paxton soils.

Charlton loam, 3 to 8 percent slopes (CaB).—Enough stones have been removed from the surface of this soil to make it fit for tillage. It has about 8 inches of dark-brown loam overlying a lighter colored subsoil of sandy loam or very fine sandy loam. Included in mapping were a few small areas of moderately well drained Woodbridge soils, some areas in which the subsoil is yellowish red to strong brown, and some less strongly sloping areas.

This soil is well suited to field and truck crops. Because it retains plant nutrients, crops respond well to the application of fertilizer and to other management practices. Erosion control is needed if the soil is clean cultivated. (Capability unit IIe–5)

Charlton loam, 8 to 15 percent slopes (CaC).—Steeper and generally longer slopes make this soil more susceptible to erosion than Charlton loam, 3 to 8 percent slopes. The surface layer is generally free of stones. A few areas of Woodbridge soils were included in mapping.

This soil is suited to cultivated crops if erosion is controlled and moisture is conserved. Most of it is now used for hay and pasture. (Capability unit IIIe–5)

Charlton loam, 15 to 25 percent slopes (CaD).—Some areas of this soil are eroded and have a thinner surface layer than Charlton loam, 3 to 8 percent slopes.

Because of the moderately steep slopes and the risk of erosion, this soil is not well suited to cultivation. It can be used for cultivated crops if runoff is controlled and close-growing crops are grown most of the time. Most of the acreage is woodland, and some areas are idle. (Capability unit IVe–5)

Charlton very stony loam, 3 to 8 percent slopes (ChB).—The stones on the surface of this soil average a foot in diameter and are 5 to 30 feet apart. Included in mapping were some areas of moderately well drained Woodbridge soils, some areas that have a yellowish-red to strong-brown subsoil, and some nearly level areas.

Because of the stones, the use of tractor-drawn equipment is limited and tillage is impractical, but some areas can be used for hay or improved pasture. This soil is largely woodland, a use to which it is well suited. (Capability unit VIs–7)

Charlton very stony loam, 8 to 15 percent slopes (ChC).—This is the most extensive of the Charlton soils. Surface stones are about 1 foot in diameter and are 5 to 30 feet apart. Included in mapping were some areas of

moderately well drained Woodbridge soils and some areas in which the subsoil is yellowish red to strong brown.

The stones limit the use of tractor-drawn equipment and make tillage impractical. Some areas are suitable for pasture. This soil is mostly woodland. It makes a fairly good habitat for woodland wildlife. (Capability unit VIs–7)

Charlton very stony loam, 15 to 25 percent slopes (ChD).—Because of erosion, this soil has a thinner surface layer than is typical of the series. Surface stones average a foot in diameter and are 5 to 30 feet apart.

This soil is mostly wooded and is well suited to trees, but harvesting is difficult on the steeper slopes. The soil is so steep and stony that clearing it for more intensive use is generally not feasible. It makes a fairly good habitat for woodland wildlife. (Capability unit VIs–7)

Charlton very stony loam, 25 to 60 percent slopes (ChE).—A few areas of this soil have been cleared of trees and stones so they can be used for skiing and other forms of recreation, and more slopes that have a northern exposure could be cleared for these purposes. This soil is well suited to trees, although equipment limitations are severe on the very steep slopes. These slopes are a severe limitation for most uses. There is some potential for woodland wildlife habitat. (Capability unit VIIs–7)

Charlton extremely stony loam, 8 to 25 percent slopes (CrD).—There are many stones and boulders on the surface of this soil and throughout the profile. A few less strongly sloping areas and some spots of Woodbridge soils were included in mapping. Rock outcrops occur in places.

Most of this soil is woodland, but harvesting trees is very difficult. The stones and boulders are a limitation for most uses. (Capability unit VIIs–58)

Charlton extremely stony loam, 25 to 60 percent slopes (CrE).—The many stones and boulders and the steep slopes limit the use of this soil for most purposes. Most of it is forested, although timber management is difficult. There is some potential for woodland wildlife habitat. (Capability unit VIIs–58)

Deerfield Series

The Deerfield series consists of deep, moderately well drained soils. Early in spring water can be seen in any holes that are 30 inches deep. These soils are on level to gently sloping sand plains. White pine, gray birch, and red maple are the trees that commonly grow on them.

Typically, a cultivated Deerfield soil has a surface layer of dark yellowish-brown loamy sand about 8 inches thick. This layer is underlain, to a depth of 15 inches, by yellowish-brown loamy sand that contains a few small pebbles. Below this, to a depth of 26 inches, is light yellowish-brown, mottled loamy sand. The lower layers are mostly sand, but in places, there are layers of gravel below a depth of 30 inches.

Permeability is rapid. Growth of deep-rooted plants is somewhat restricted because the high water table limits soil air in the lower layers. Crops grown on these soils respond well to artificial drainage.

Deerfield soils are suited to many farm uses, but seasonal wetness is a severe limitation for septic tank systems, dwellings with a basement, and other nonfarm uses.

Profile of Deerfield loamy sand (slope of 4 percent) in a hayfield 1 mile east of Laconia:

Ap—0 to 8 inches, dark yellowish-brown (10YR 4/4) loamy sand; moderate, fine, granular structure; friable; many roots; 2 percent coarse fragments less than one-half inch in diameter; very strongly acid; clear, wavy boundary. 7 to 11 inches thick.

B21—8 to 15 inches, yellowish-brown (10YR 5/8) loamy sand; weak, fine, granular structure; very friable; common roots; 1 percent coarse fragments less than one-half inch in diameter; strongly acid; clear, wavy boundary. 5 to 7 inches thick.

B22—15 to 26 inches, light yellowish-brown (2.5Y 6/4) loamy sand with common, medium, distinct, strong-brown (7.5YR 5/8) mottles; weak, fine, granular structure; very friable; few roots; 1 percent coarse fragments less than one-half inch in diameter; medium acid; abrupt, wavy boundary. 10 to 15 inches thick.

C—26 to 35 inches, light yellowish-brown (2.5Y 6/4) coarse sand with few, fine, distinct, strong-brown (7.5YR 5/8) mottles; single grain; loose; no roots; 5 percent coarse fragments less than one-half inch in diameter; medium acid.

The texture of the A horizon is generally loamy sand. That of the B horizon is generally loamy sand but ranges to sand. This horizon may have up to 20 percent fine gravel less than 6 millimeters in diameter. The color of the B horizon becomes paler or yellower with depth. The hue is 7.5YR or 10YR in the upper part and 10YR or 2.5Y in the lower part. The value ranges from 4 to 6, and the chroma from 3 to 8. The texture of the C horizon is generally sand, but this layer may contain unconforming stratified gravel at a depth of 30 inches or more. The hue of the C horizon ranges from 5Y to 10YR. The value ranges from 3 to 6, and the chroma from 1 to 4. The depth to mottling ranges from 12 to 30 inches.

Drainage is predominantly in the moderately well drained class, but it extends into the upper range of the somewhat poorly drained class. The water table drops more than 4 feet in dry seasons. Reaction ranges from very strongly acid to medium acid and may be slightly acid in the lower B horizon and in the C horizon. In places small amounts of gravel are scattered throughout the profile, but generally the profile is gravel free.

Deerfield soils adjoin the droughty Windsor and the seasonally wet Au Gres soils. They are in a drainage sequence with those soils and the strongly gleyed, very poorly drained Scarboro soils.

Deerfield loamy sand, 0 to 3 percent slopes (DeA).—This soil has a thicker surface layer than is typical of the series. It occupies long, narrow strips near wetter soils. Included in mapping were small areas of Au Gres soils, some areas of moderately well drained gravelly soils, areas that have a finer textured surface soil and subsoil, and areas in which a reddish-brown to yellowish-red layer occurs at a depth of 6 to 10 inches.

This soil is suited to hay and pasture and is excellent for trees. The water table is normally 1 to 1½ feet from the surface early in spring and after prolonged rains. Subsurface drainage would improve this soil for corn, truck crops, and deep-rooted legumes and for most nonfarm uses. The potential is good for openland and woodland wildlife habitats. (Capability unit IIw–22)

Deerfield loamy sand, 3 to 8 percent slopes (DeB).—This soil occupies gentle side slopes of depressions in the sand plains. Included with it in mapping were areas that have a finer textured surface layer and subsoil, areas that have a reddish-brown to yellowish-red layer at a depth of 6 to 10 inches, areas that have gravel in the subsoil, and areas that are more strongly sloping.

This soil is excellent for trees. Artificial drainage would improve it for corn, truck crops, and deep-rooted legumes. Outlets for subsurface drainage are more readily obtained on this soil than on the more nearly level Deerfield soils. The water table is commonly 18 to 30 inches from the sur-

face in the spring and during rainy periods. Conservation practices are needed to control water and erosion if the soil is clean cultivated.

This soil is well suited to development of openland and woodland wildlife habitats. The seasonal high water table is the only significant limitation for other uses. (Capability unit IIw–22)

Gloucester Series

The Gloucester series consists of somewhat excessively drained soils that formed in deep, sandy and stony glacial till. These soils are gently sloping to very steep. Their vegetation consists of white pine, red oak, beech, gray birch, and white birch. They are on the hills and mountains in the northern and eastern parts of the county.

A forested very stony Gloucester soil typically has about an inch of fresh leaves over a 4-inch surface layer of dark yellowish-brown, granular sandy loam. The subsoil, to a depth of 24 inches, is yellowish-brown coarse sandy loam and loamy sand. Below this, to a depth of 44 inches, is light brownish-gray gravelly loamy sand that contains stones of various sizes.

These soils are commonly loose and, although stony, are easy to dig. They are rapidly permeable and somewhat droughty.

Except for slope and stoniness, Gloucester soils have no serious limitations for most nonfarm uses.

Profile of Gloucester very stony sandy loam (slope of 10 percent) in a wooded area 3 miles west of the village of Alton near Sunset Lake:

O1—1 inch to 0, fresh leaves of oak, beech, white pine, and birch.

A1—0 to 4 inches, dark yellowish-brown (10YR 3/4) sandy loam; weak, fine, granular structure; very friable; many roots; 8 percent gravel, and about 2 percent stones larger than 10 inches in diameter; very strongly acid; abrupt, smooth boundary. 2 to 5 inches thick.

B21—4 to 13 inches, yellowish-brown (10YR 5/6) coarse sandy loam; weak, medium, granular structure; very friable; common roots; 10 percent gravel; 10 percent stones; strongly acid; clear, wavy boundary. 7 to 10 inches thick.

B22—13 to 24 inches, yellowish-brown (10YR 5/4) loamy sand; massive, breaking to clods; very friable; few roots; 15 percent gravel; strongly acid; clear, wavy boundary. 8 to 12 inches thick.

C—24 to 44 inches, light brownish-gray (2.5Y 6/2) gravelly loamy sand; massive, breaking to clods; friable; few roots; 25 percent gravel; 20 percent stones; strongly acid.

The texture of the A horizon is generally sandy loam, but in places it is loamy sand. The texture of the lower B horizon ranges from loamy sand to gravelly loamy coarse sand. The silt content of this layer is less than 25 percent, and coarse fragments make up 10 to 60 percent of the soil mass. The B horizon has a hue of 7.5YR or 10YR in the upper part and 10YR or 2.5Y in the lower part. The value and chroma generally range from 4 to 6, although the chroma in the lower B horizon may be 3. The C horizon ranges from 10YR to 5Y in hue, from 4 to 7 in value, and from 1 to 4 in chroma. The reaction ranges from extremely acid to medium acid.

Surface stones range from none in cleared fields to very many in forested areas. In some places there is a somewhat firm layer, deep in the profile, that restricts downward movement of water.

Gloucester soils are in the same drainage sequence with the somewhat excessively drained Shapleigh soils, the moderately well drained Acton soils, and the very poorly drained Whitman soils. They have a coarser textured B horizon to a depth of about 24 inches than have the Charlton soils. They do not have the pan layer that is characteristic of the Paxton soils.

Gloucester sandy loam, 3 to 8 percent slopes (GcB).—This somewhat excessively drained soil has had enough stones removed from the surface to make it fit for tillage. Included with it in mapping were areas that have a reddish-brown to yellowish-red layer in the upper part of the subsoil and areas that are less strongly sloping.

This soil is suited to cultivated crops and to hay and pasture, although it is seasonally droughty. Conservation practices are needed to control water and erosion if the soil is clean cultivated. Subsurface stones interfere with tillage in places. White pine, red spruce, and northern hardwoods generally grow well. (Capability unit IIs–55)

Gloucester sandy loam, 8 to 15 percent slopes (GcC).—This somewhat excessively drained soil has had most of the stones removed. It has a thinner surface layer than Gloucester sandy loam, 3 to 8 percent slopes. Included in mapping were areas in which the upper subsoil is reddish brown to yellowish red.

This soil is well suited to white pine, red spruce, and northern hardwoods. It is suited to cultivated crops and to hay and pasture, although it is seasonally droughty. In places, subsurface stones interfere with tillage. Erosion is a hazard, and conservation practices are needed to control it if the soil is clean cultivated. (Capability unit IIIe–55)

Gloucester sandy loam, 15 to 25 percent slopes (GcD).—This soil is on the hilly uplands. It has a dark-brown surface layer about 6 inches thick. Stones have been removed from it so that tractor-drawn equipment can be used, although the steeper areas are difficult to work safely. Included in mapping were some areas in which the upper subsoil is reddish brown to yellowish red.

Pasture, hay, and woodland are the common uses of this soil. Erosion is a severe problem unless sod is maintained. White pine, red spruce, and northern hardwoods grow well, but they are difficult to harvest on the steeper slopes. (Capability unit IVe–55)

Gloucester very stony sandy loam, 3 to 8 percent slopes (GrB).—Because there are surface stones 5 to 30 feet apart, it is not practical to grow cultivated crops on this soil. Acton soils and less sloping Gloucester soils were included in mapping. Also included were areas in which there is a thin, gray, ashlike layer in the surface soil, underlain by a reddish-brown to yellowish-red layer in the upper subsoil.

This soil is seasonally droughty. It is used mostly as woodland, to which it is well suited. White pine, red spruce, and northern hardwoods grow well. There is fair potential for woodland wildlife habitat. Stones and droughtiness may interfere with landscaping and the establishment of lawns. (Capability unit VIs–7)

Gloucester very stony sandy loam, 8 to 15 percent slopes (GrC).—Surface stones 5 to 30 feet apart make this soil unsuitable for cultivated crops. Included in mapping were scattered areas that have a thin, gray, ashlike layer in the surface soil, underlain by a reddish-brown to yellowish-red layer in the upper subsoil.

This soil is well suited to white pine, red spruce, and northern hardwoods. Some areas are suitable for pasture. Stone removal and erosion control are the main management problems. (Capability unit VIs–7)

Gloucester very stony sandy loam, 15 to 25 percent slopes (GrD).—This soil is on upland hills where stones are so numerous that the growing of cultivated crops is not feasible. As a result of erosion, it has a thinner surface

layer in places than Gloucester very stony sandy loam, 8 to 15 percent slopes.

This seasonally droughty soil is used mostly as woodland. The moderately steep slopes limit the use of some logging equipment. Some areas are suitable for pasture, and there is some potential for woodland wildlife habitat. (Capability unit VIs–7)

Gloucester very stony sandy loam, 25 to 60 percent slopes (GrE).—As a result of erosion, the surface layer of this soil is thinner in places than that of Gloucester soils of lesser slope. Surface stones are 5 to 30 feet apart over most of the acreage and closer together in gullies and drainageways. Areas that have been cleared of stones were included with this soil in mapping. Also included were areas that have a reddish-brown to yellowish-red layer in the upper subsoil.

Steepness limits the use of this soil mainly to woodland, and it restricts the use of logging equipment. Some slopes with a northern exposure have a good potential for the development of ski areas. (Capability unit VIIs–7)

Gloucester extremely stony sandy loam, 8 to 25 percent slopes (GsD).—This soil is on hillsides and in mountainous areas. In many places it has a thicker layer of organic matter on the surface than other soils of the series. Included in mapping were some areas of Acton soils, some areas of less strongly sloping Gloucester soils, and some areas of soils that have a reddish-brown to yellowish-red layer in the upper subsoil. Stones and boulders are generally less than 5 feet apart, and rock outcrops occur in places.

This soil is used primarily as woodland, but the many stones and boulders make harvesting operations difficult. (Capability unit VIIs–58)

Gloucester extremely stony sandy loam, 25 to 60 percent slopes (GsE).—Surface stones on this soil are numerous enough to be steppingstones. Included in mapping were some areas in which the upper subsoil is reddish brown to yellowish red.

Most of this soil is woodland. Some slopes that have a northern exposure could be developed for skiing, but access is poor and road construction is difficult. (Capability unit VIIs–58)

Gravel and Borrow Pits

Gravel and Borrow pits (Gv) are open excavations from which gravel, sand, and other material have been removed. Typically, these excavations are located on sand plains and terraces and along streams. Fresh pits are common adjacent to new highways. A few pits are in upland till areas. Small pits are shown on the soil map by symbol instead of as separate areas. This mapping unit has not been assigned to a capability unit.

Hinckley Series

The Hinckley series consists of excessively drained, nearly level to very steep soils that formed in deep, layered sand and gravel. These soils are mostly on terraces. White pine, red pine, and gray birch are the common trees.

Hinckley soils are stone free. They have an 8-inch surface layer of very dark grayish-brown loamy sand. The subsoil consists of 4 or 5 inches of dark yellowish-brown gravelly loamy sand. It is underlain by layers of very gravelly sand and coarse sand that extend to a depth of 6 feet or more.

These soils are droughty and very rapidly permeable. The entire subsoil is loose and porous enough for free movement of air, water, and roots.

Hinckley soils have few limitations for most nonfarm uses. Droughtiness limits the establishment and maintenance of lawns, and slope limits some nonfarm uses. Many areas of Hinckley soils are sources of sand and gravel for construction work.

Profile of Hinckley loamy sand (slope of 5 percent) in a wooded area at the junction of Hurricane and Lochmere Roads in the town of Belmont:

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) loamy sand; single grain; loose; many roots; 10 percent gravel; very strongly acid; abrupt, smooth boundary. 6 to 9 inches thick.

B2—8 to 13 inches, dark yellowish-brown (10YR 4/4) gravelly loamy sand; single grain; loose; common roots; 25 percent gravel; medium acid; abrupt, smooth boundary. 4 to 8 inches thick.

C1—13 to 21 inches, yellowish-brown (10YR 5/8) very gravelly coarse sand; single grain; loose; few roots; 50 percent gravel; medium acid; clear, smooth boundary. 7 to 9 inches thick.

C2—21 to 30 inches, yellowish-brown (10YR 5/8), very gravelly, very coarse sand; single grain; loose; no roots; 50 percent gravel; medium acid; clear, smooth boundary. 8 to 9 inches thick.

IIC3—30 to 50 inches, brownish-yellow (10YR 6/8) coarse sand; single grain; loose; no roots; no gravel; medium acid; clear, smooth boundary. 19 to 20 inches thick.

IIC4—50 to 75 inches, yellow (10YR 7/6) and strong-brown (7.5YR 5/6) sand; single grain; loose; no gravel; medium acid.

The texture of the A horizon is loamy sand or gravelly loamy sand. The texture of the B horizon, below a depth of 10 inches, ranges from loamy coarse sand to gravelly sand, and in some places this horizon is cobbly. The substratum consists of layers of sand and gravel, or sand, gravel, and cobblestones. Coarse fragments constitute up to 90 percent of the substratum. The color of the B horizon ranges from 7.5YR to 10YR in hue, from 3 to 5 in value, and from 4 to 8 in chroma. A hue of 10YR is common in the substratum, although the hue is 2.5Y in some places. The value ranges from 4 to 8, and the chroma from 2 to 8. The average thickness of the solum is 18 inches, but the range is from 10 to 24 inches. Reaction ranges from extremely acid to medium acid.

Hinckley soils are droughtier than the neighboring stony Gloucester soils. They contain much more gravel than the nearby Windsor soils. Other soils that formed in layered sand and gravel are the moderately well drained Deerfield, the poorly drained Au Gres, and the very poorly drained Scarboro soils.

Hinckley gravelly loamy sand, 15 to 60 percent slopes (HrE).—This soil is on kames, eskers, and terraces. It is more gravelly than most Hinckley soils, and it is extremely droughty. Included with it in mapping were areas that have a reddish-brown to yellowish-red layer at a depth of 6 to 10 inches, areas that have yellowish-red to strong-brown colors throughout the subsoil, and areas that have a finer textured surface layer.

This soil is nearly all forested. Even if cleared, it would be too droughty, too erodible, too low in fertility, and mostly too steep for crops, hay, or pasture. It is too steep for most nonfarm uses. (Capability unit VIIs–27)

Hinckley loamy sand, 0 to 3 percent slopes (HsA).—This soil is on terraces well above flood plains. Included with it in mapping were areas that have a reddish-brown to yellowish-red layer at a depth of 6 to 10 inches and areas that have yellowish-red to strong-brown colors

throughout the subsoil. In some parts of the county, small areas of Windsor soils were included.

Most of this soil is wooded, but some of it is idle. Permeability is so rapid that little moisture is retained for plant growth. Crop production is difficult unless this soil is irrigated. If it is irrigated, large amounts of lime and fertilizer are needed so that yields will justify irrigation. The content of organic matter should be kept at as high a level as possible.

This soil has good potential for nonfarm uses. Many areas of it are used for residential and industrial development, and it is more desirable for these purposes than the steeper Hinckley soils. (Capability unit IIIs–26)

Hinckley loamy sand, 3 to 8 percent slopes (HsB).—Most of this soil is on sandy and gravelly plains, where it adjoins the stony Gloucester soils. Included in mapping were areas of soils that have a reddish-brown to yellowish-red layer at a depth of 6 to 10 inches, areas that have yellowish-red to strong-brown colors throughout the subsoil, and very small areas of Windsor soils.

This soil holds so little moisture that irrigation is necessary if crops are grown. Conservation practices are needed if this soil is clean cultivated. Most areas are wooded, some are idle, and some are used for nonfarm purposes. (Capability unit IIIs–26)

Hinckley loamy sand, 8 to 15 percent slopes (HsC).—This soil has more gravel closer to the surface than the soil described as representative of the series. The slopes are short and irregular. This is an extremely droughty soil that is low in natural fertility and in content of organic matter. Included in mapping were some areas that have a reddish-brown to yellowish-red layer in the upper part of the subsoil, and some that have yellowish-red to strong-brown colors throughout the subsoil.

This soil is rapidly or very rapidly permeable. It seldom holds enough available water to produce hay, pasture, or general farm crops without irrigation. Conservation practices are needed to control water and erosion if this soil is clean cultivated. Gravel has been taken from it in a few places. Except where the slopes are extremely short and irregular, this soil has few limitations for community development. (Capability unit IVs–26)

Made Land

Made land (Ma) consists of areas that have been filled with earth or trash, and then leveled. The normal soil profile has been covered or destroyed by artificial earth-moving operations. Included in mapping were a few small areas where the surface soil has been removed and the excavation has not been filled.

Conditions for plant growth vary; consequently, the kind of management needed varies. Made land has not been assigned to a capability unit.

Marsh

Marsh (Mh) is covered by shallow water most of the time. It occurs mainly around lakes and ponds but is also in depressions that contain water much of the year. Marsh vegetation consists of grasses, reeds, sedges, cattails, and rushes. The land is too wet for trees. Marsh has no value for tilled crops, pasture, or woodland, but it is important as a habitat for wetland wildlife. (Capability unit VIIIw–89)

Mixed Alluvial Land, Wet

Mixed alluvial land, wet (Ml) is made up of various kinds of soils and soil materials on the bottom lands of streams and rivers. The soil material varies in texture from silt loam to sand and gravel. It is moderately well drained to very poorly drained and is frequently flooded. Alders, sedges, rushes, and red maple are common vegetation.

Much of this land is waterlogged most of the time, and drainage generally is not feasible. The land is commonly used by wildlife. (Capability unit VIIw–14)

Muck and Peat

Muck and Peat (Mp) consists of deposits of organic matter that are 12 inches to 30 feet deep and in most places at least 3 feet deep. The native vegetation on areas not forested consists mainly of mosses, sedges, reeds, high-bush blueberries, and cranberries (fig. 3). Forested areas produce red maple, white pine, red spruce, hemlock, and balsam fir.

This land type occupies formerly ponded depressions in uplands, sand plains, and flood plains, where plant remains have accumulated for a long time. The ground-water level

Figure 3.—**An area of Muck and Peat with low-growing vegetation typical of many of these areas.**

is near enough to the surface to keep the plant remains saturated most of the year and thus to help preserve them. These depressions are frost pockets, in which frost is likely to occur very late in spring and very early in fall. Some of the depressions are flooded by runoff from higher areas.

In some places, the surface layer formed from the residue of trees and other woody plants. In other places it formed from mosses, reeds, and sedges. Where the plant material is sufficiently fresh and intact to permit identification of plant forms, the material is Peat. Where the plant material is so decomposed that recognition of plant parts is impossible, the material is Muck. Most areas are extremely acid.

Because of its variable features, Muck and Peat has not been assigned to a capability unit.

Ondawa Series

The Ondawa series consists of nearly level, well-drained soils that formed in deep sand and are subject to occasional flooding. These soils are mostly on high bottoms along the Pemigewasset and Gunstock Rivers.

Ondawa soils have a surface layer of grayish-brown fine sandy loam about 5 inches thick. Below this is dark-brown to dark yellowish-brown fine sandy loam. This is underlain at a depth of 20 inches by dark yellowish-brown and yellowish-brown loamy sand.

Ondawa soils are rapidly permeable and usually supply adequate moisture for plants. They are commonly used for hay and pasture, although they are suitable for intensive cropping if well managed.

Profile of Ondawa fine sandy loam (slope of 2 percent) on high bottom land in pasture on the east bank of the Pemigewasset River 1 mile north of Knox Brook in Sanbornton:

A1—0 to 5 inches, grayish-brown (10YR 5/2) fine sandy loam; weak, fine, granular structure; very friable; many fine roots; very strongly acid; abrupt, smooth boundary. 2 to 3 inches thick.

B21—5 to 12 inches, dark-brown (10YR 4/3) fine sandy loam; massive; very friable; common roots; strongly acid; abrupt, smooth boundary. 5 to 8 inches thick.

B22—12 to 20 inches, dark yellowish-brown (10YR 4/4) fine sandy loam; massive; very friable; few roots; medium acid; abrupt, smooth boundary. 5 to 8 inches thick.

IIC1—20 to 30 inches, dark yellowish-brown (10YR 4/4) loamy sand; massive; very friable; no roots; medium acid; abrupt, smooth boundary. 12 to 15 inches thick.

IIC2—30 to 34 inches, yellowish-brown (10YR 5/4) loamy sand; massive; very friable; no roots; slightly acid.

The texture of the surface layer is fine sandy loam or sandy loam. Below a depth of 20 inches, the texture ranges from fine sandy loam to gravel. The hue of the A horizon is 10YR or 2.5Y, and value is 3, 4, or 5, and the chroma is 2 or 3. The B horizon is massive or has a weak subangular blocky structure. The B and C horizons have a hue of 10YR or 2.5Y, a value of 3 to 6, and a chroma of 2 to 4. The reaction ranges from very strongly acid to slightly acid.

Ondawa soils commonly adjoin steep gravelly Hinckley soils, sandy Windsor soils, and other soils along the rivers. They are members of a drainage sequence with the moderately well drained Podunk and the poorly drained Rumney soils.

Ondawa fine sandy loam, high bottom (Oh).—This soil commonly lies between a river and poorly drained soils at the foot of terraces. Included with it in mapping were small areas of Podunk soils, some areas of silty soils, and some small areas on low bottoms.

This soil is suited to field crops, truck crops, hay, and pasture. It is seldom flooded, except for those areas in the flood control reservation north of Franklin Falls Dam and some included areas on low bottoms. Wind erosion is a hazard on large fields. Special management is needed to maintain the organic-matter content. Possible flooding is a limitation for residential and industrial development. The potential for development of openland and woodland wildlife habitats is good. (Capability unit I–1)

Paxton Series

The Paxton series consists of well-drained loamy soils that formed in stony glacial till. These soils are nearly level to very steep. They have a hard layer at a depth of about 22 inches that is difficult to dig with a spade. They are mostly on the upper parts of rolling foothills in the central and southern sections of the county. White pine, sugar maple, red oak, and northern hardwoods are the common merchantable trees on these soils.

A wooded very stony Paxton soil has a thin layer of fresh and partly decayed pine needles over 3 to 4 inches of dark-brown loam that crumbles in the hands. Below this, to a depth of 14 inches, is crumbly, light olive-brown fine sandy loam and sandy loam overlying 2 to 5 inches of light yellowish-brown sandy loam. Below a depth of 18 inches is hard, compact glacial till that contains a few rock fragments.

Permeability is moderate above the pan layer, but slow through the pan. Water moves over the pan and comes to the surface downslope as seep spots. The supply of water available to plants is generally adequate.

These are among the better soils on the uplands for farming. They also produce good yields of timber. The slowly permeable subsoil is a limitation to septic tank systems.

Profile of Paxton very stony loam (slope of 11 percent) in woods one-half mile northwest of the junction of Route 25 and Knight Road in Meredith:

O1—1½ inches to 1 inch, fresh pine needles and twigs.

O2—1 inch to 0, partly decayed pine needles.

A1—0 to 4 inches, dark-brown (10YR 4/3) loam; weak, fine, granular structure; very friable; about 2 percent stones greater than 10 inches in diameter; many roots; strongly acid; clear, wavy boundary. 3 to 4 inches thick.

B21—4 to 8 inches, light olive-brown (2.5Y 5/6) fine sandy loam; weak, fine, granular structure; very friable; many roots; 2 percent gravel; very strongly acid; clear, wavy boundary. 2 to 8 inches thick.

B22—8 to 14 inches, light olive-brown (2.5Y 5/4) sandy loam; weak, fine, granular structure; very friable; many roots; 4 percent gravel; strongly acid; clear, wavy boundary. 4 to 8 inches thick.

B23—14 to 18 inches, light yellowish-brown (2.5Y 5/4) sandy loam; moderate, fine, granular structure with a very slight tendency to platiness; friable; common roots; 3 percent gravel; strongly acid; abrupt, wavy boundary. 2 to 5 inches thick.

C1x—18 to 27 inches, light brownish-gray (2.5Y 5/2) sandy loam; moderate, medium, platy structure; firm; few fine roots; 10 percent gravel; strongly acid; diffuse, wavy boundary. 7 to 11 inches thick.

C2x—27 to 35 inches, grayish-brown (2.5Y 5/2) sandy loam; moderate, medium, platy structure; very firm; no roots; 8 percent gravel; strongly acid; material in vertical cracks is light yellowish brown (2.5Y 6/4); firm in place; friable when removed.

The texture of the A horizon is loam or fine sandy loam. That of the B and C horizons ranges from loam to sandy loam. In some places these horizons are gravelly. The silt

content is more than 25 percent throughout the solum. Coarse fragments make up 2 to 25 percent of the soil mass. The color of the B horizon ranges from 7.5YR to 2.5Y in hue, from 3 to 5 in value, and 4 to 8 in chroma. The color of the fragipan ranges from 2.5Y to 5Y in hue, from 4 to 5 in value, and from 2 to 4 in chroma. The depth to the fragipan generally is between 18 and 25 inches but ranges from 16 to 36 inches. The reaction ranges from strongly acid to medium acid.

Most areas of Paxton soils are near Shapleigh soils, which are shallow to bedrock. The characteristic pan layer in Paxton soils is not present in neighboring Gloucester and Charlton soils. Paxton soils are members of a drainage sequence that includes the moderately well drained Woodbridge, the poorly drained Ridgebury, and the very poorly drained Whitman soils.

Paxton loam, 0 to 8 percent slopes (PaB).—This soil occurs as long strips on the crests of drumlins. The surface layer is 7 to 9 inches of dark-brown loam that is stone free and has been plowed many times. Included with this soil in mapping were areas that have a reddish-brown to yellowish-red layer in the upper subsoil. Also included were small areas of Woodbridge soils and soils that have a coarse-textured surface layer and subsoil.

This soil is well suited to cultivated crops and to hay and pasture. It retains plant nutrients, and crops grown on it respond well to the application of fertilizer and to other management practices. The potential for openland and woodland wildlife habitats is good. (Capability unit IIe–6)

Paxton loam, 8 to 15 percent slopes (PaC).—This soil has a 5- to 7-inch surface layer that is stone free. It occupies the side slopes of drumlins, along with a few areas of very stony Paxton soils, which were included with it in mapping. Also included were areas that have a reddish-brown to yellowish-red layer in the upper subsoil.

This soil is well suited to cultivated crops and to hay and pasture. A pan at a depth of about 20 inches restricts drainage slightly. Consequently, the soil is wet in spring or during rainy periods and is difficult to work for truck crops. It retains plant nutrients, and crops grown on it respond well to the application of fertilizer and to other management practices. If clean-cultivated crops are grown, intensive conservation practices are needed to control water and erosion. The potential for the development of openland and woodland wildlife habitats is good. (Capability unit IIIe–6)

Paxton loam, 15 to 25 percent slopes (PaD).—This soil occurs as long, narrow strips on the sides of drumlins and upland hills. It has a 4- to 6-inch surface layer that is stone free. A pan generally occurs at a depth of 16 to 20 inches. Included in mapping were areas having a reddish-brown to yellowish-red layer in the upper part of the profile.

This soil is suited to cultivated crops and to hay and pasture. Keeping it in continuous sod is advisable in order to control erosion, but it can be used for limited cultivation. The strong slopes limit the use of logging equipment and the maintenance of woodland roads. The potential for woodland wildlife habitat is good. (Capability unit IVe–6)

Paxton very stony loam, 3 to 8 percent slopes (PnB).—This soil is on glaciated uplands and occurs as narrow strips on drumlin crests and as broader areas on other gently sloping landforms. Surface stones are about a foot in diameter and are generally 5 to 30 feet apart, but scattered small areas are stonier. Included in mapping were some areas of Woodbridge soils and more nearly level Paxton soils. Also included were areas that have a reddish-brown to yellowish-red layer in the upper part of the subsoil.

Because of the stones, the use of tractor-drawn equipment is limited and cultivation is impractical, but some areas can be used for improved pasture. Much of this soil is in trees, to which it is well suited. The potential for woodland wildlife habitat and for recreational use is fair. (Capability unit VIs–7)

Paxton very stony loam, 8 to 15 percent slopes (PnC).—This soil most commonly occurs on the sides of drumlins, but it also occurs on other landforms. Surface stones are generally 5 to 30 feet apart, but there are small, stonier areas.

Included in mapping were areas of coarser textured soil and areas in which a reddish-brown to yellowish-red layer occurs in the upper part of the subsoil. Also included were areas of Woodbridge soils, but they are fewer than those included with Paxton very stony loam, 3 to 8 percent slopes.

This soil is mostly wooded and produces good yields of the common commercial trees. Because of the stones, the use of tractor-drawn equipment is restricted and cultivation is impractical, but some areas can be used for improved pasture. (Capability unit VIs–7)

Paxton very stony loam, 15 to 25 percent slopes (PnD).—Because of erosion, this soil has a thinner surface layer than the soil described as representative of the series. The surface stones are generally 5 to 30 feet apart, but there are small areas where they are more concentrated. In places, water moves downslope over the pan and comes to the surface as seep spots on lower slopes. Included in mapping were areas that have a reddish-brown to yellowish-red layer in the upper part of the subsoil.

Most of this soil is wooded. Clearing such steep and very stony soil for more intensive use is generally not economically feasible. Timber management is also difficult on the steeper slopes. The potential for woodland wildlife habitat is fairly good. (Capability unit VIs–7)

Paxton very stony loam, 25 to 60 percent slopes (PnE).—This soil commonly occupies short, steep side slopes of drumlins and long, wooded slopes. Because of erosion, this soil has a thinner surface layer in some places than Paxton very stony loam, 8 to 15 percent slopes, and the pan is closer to the surface. Included in mapping were a few areas that have been cleared of trees and stones for skiing and other forms of recreation. Included also were small areas that have a reddish-brown to yellowish-red layer in the upper part of the subsoil.

This soil can be used as woodland, although equipment limitations are severe on the very steep slopes. Some slopes with a northern exposure have a good potential for establishment of ski areas. There is a potential for woodland wildlife habitat. (Capability unit VIIs–7)

Podunk Series

The Podunk series is made up of moderately well drained, nearly level soils on flood plains. These soils formed in deep, water-sorted sand. They are near large and small streams in the county and are flooded annually. The present woody vegetation consists mostly of alder, willow, and red maple.

Podunk soils have 7 to 8 inches of grayish-brown fine sandy loam overlying layers of very dark grayish-brown and grayish-brown fine sandy loam, loamy fine sand, and loam that are mottled with dark-brown below a depth of 16 inches.

Permeability is rapid, and the available water capacity is moderate.

Profile of Podunk fine sandy loam (slope of 1 percent) in pasture in the town of Gilford:

Ap—0 to 8 inches, grayish-brown (2.5Y 5/2) fine sandy loam; weak, fine, granular structure; very friable; many roots; medium acid; abrupt, smooth boundary. 7 to 8 inches thick.

B21—8 to 12 inches, very dark grayish-brown (10YR 3/2) fine sandy loam; moderate, medium, granular structure; friable; many roots; strongly acid; clear, smooth boundary. 3 to 5 inches thick.

B22—12 to 16 inches, dark-brown (10YR 3/3) fine sandy loam with few, fine, faint, yellowish-brown (10YR 5/8) mottles; moderate, medium, granular structure; friable; common roots; strongly acid; clear, wavy boundary. 3 to 5 inches thick.

IIC1—16 to 22 inches, yellowish-brown (10YR 5/4) loamy fine sand with common, medium, faint, dark-brown (10YR 3/3) mottles; weak, medium, granular structure; very friable; few roots; medium acid; clear, wavy boundary. 5 to 7 inches thick.

IIC2g—22 to 26 inches, very dark grayish-brown (10YR 3/2) loam with many, medium, faint, dark-brown (7.5YR 4/4) mottles; moderate, medium, granular structure; friable; few roots; strongly acid; clear, wavy boundary. 3 to 5 inches thick.

IIC3g—26 to 36 inches, grayish-brown (2.5Y 5/2) loamy fine sand with many, medium, prominent, dark-brown (7.5YR 4/4) mottles; weak, medium, granular structure; friable; no roots; medium acid.

The texture of the A horizon is fine sandy loam or sandy loam. The color of the A horizon ranges from 10YR to 2.5Y in hue, from 2 to 5 in value, and from 2 to 4 in chroma. The texture of the B and C horizons generally ranges from fine sandy loam to loamy sand, but lenses of silt loam or loam may be in the profile In places gravel occurs in the substratum. The color of the B and C horizons ranges from 10YR to 5Y in hue, from 3 to 6 in value, and from 1 to 4 in chroma. Mottling occurs at a depth between 12 and 20 inches. Drainage is centered on the moderately well drained class, but extends into the upper range of the somewhat poorly drained class. Reaction ranges from strongly acid to slightly acid.

Adjoining the Podunk soils are the well-drained Ondawa soils on high bottom land that is seldom flooded and the poorly drained Rumney soils on low bottom land that is flooded annually.

Podunk fine sandy loam (Po).—Included with this soil in mapping were small areas of a finer textured soil and spots of poorly drained Rumney soils.

Periodic flooding and a seasonal high water table are management problems. Drainage is needed to lower the water table, particularly in areas that are cultivated. Downward movement of water is rapid after the water table is lowered. Moisture is usually available for crops during dry summer months.

This soil is suited to hay and pasture and is fairly well suited to silage corn and late vegetables, but large amounts of lime and fertilizer are required. It is well suited to development of openland and woodland wildlife habitats. Flooding and seasonal wetness limit most nonfarm uses. (Capability unit IIw–12)

Ridgebury Series

The Ridgebury series consists of poorly drained soils that have a pan at a depth of 18 inches. These soils formed in deep, compact stony till. They occupy the depressions and the nearly level and gently sloping areas throughout most of the county. Water is at or near the surface during wet seasons. Most areas are wooded with white pine, hemlock, white ash, and red maple.

A plowed Ridgebury soil has 6 to 8 inches of very dark gray loam underlain by 4 to 6 inches of light-gray sandy loam mottled with yellowish red. The underlying subsoil, to a depth of 18 inches, is light olive-brown sandy loam mottled with strong brown. The subsoil is underlain by very compact, light olive-brown gravelly sandy loam that is hard to dig with a spade.

Ridgebury soils are saturated with water most of the year. The water table is near the surface from late in fall through most of spring. After the water table lowers, the downward movement of water is moderate above the pan but slow in the pan.

The high water table limits soil air, severely restricts plant growth, and makes the soils slow to warm in spring. It also severely limits the use for industrial and residential sites and for some kinds of recreation sites.

Profile of Ridgebury loam (slope of 5 percent) in a hayfield 1¾ miles southeast of Lochmere substation in Belmont:

Ap—0 to 7 inches, very dark gray (10YR 3/1) loam; moderate, fine, granular structure; friable; many roots; 5 percent gravel; medium acid; reddish-brown stains along roots; abrupt, wavy boundary. 6 to 8 inches thick.

A2g—7 to 12 inches, light-gray (5Y 6/1) sandy loam with many, medium, prominent, yellowish-red (5YR 4/8) mottles; weak, medium, platy structure; friable; roots are common; medium acid; abrupt, wavy boundary. 4 to 6 inches thick.

B2—12 to 18 inches, light olive-brown (2.5Y 5/4) sandy loam with many, medium, prominent, strong-brown (7.5YR 5/8) mottles; weak, medium, platy structure; friable; roots are common; medium acid; clear, wavy boundary. 5 to 10 inches thick.

C1x—18 to 23 inches, light olive-brown (2.5Y 5/4) gravelly sandy loam with a few gray (5Y 6/1) polygon streaks; massive; very firm; few roots; 25 percent gravel; medium acid; clear, wavy boundary. 4 to 6 inches thick.

C2x—23 to 32 inches, light olive-brown (2.5Y 5/4) gravelly sandy loam; gray (5Y 6/1) polygon streaks outlined with yellowish red (5YR 4/8) make up 20 percent of this layer; moderate, medium, platy structure; very firm; no roots; 20 percent gravel; medium acid; clear, wavy boundary. 8 to 10 inches thick.

C3x—32 to 40 inches, light olive-brown (2.5Y 5/4) gravelly sandy loam; gray (5Y 6/1) polygon streaks outlined with yellowish red (5YR 4/8) make up 10 percent of this layer; moderate, medium, platy structure; very firm; no roots; 20 percent gravel; medium acid.

The texture of the surface layer is loam or fine sandy loam. The texture of the B and Cx horizons is coarse sandy loam to loam, and in some places these horizons are gravelly. Coarse fragments commonly make up less than 50 percent of the soil mass. The color of the B horizon ranges from 10YR to 5Y in hue, 4 to 6 in value, and 2 to 4 in chroma. The depth to the fragipan is generally 18 inches but ranges from 14 to 24 inches. Depth to distinct mottling ranges from 5 to 12 inches. Drainage is centered on the poorly drained class but extends into the lower range of the somewhat poorly drained class. Reaction ranges from very strongly acid to medium acid.

Ridgebury soils are members of a drainage sequence with the well drained Paxton soils, the moderately well drained Woodbridge soils, and the very poorly drained Whitman soils. The Whitman soils are very stony and generally have a thin, black muck surface layer. The Paxton soils are more strongly sloping than Ridgebury soils. The nearby Gloucester soils are somewhat excessively drained and are also more strongly sloping.

In Belknap County the very stony phases of Ridgebury and Whitman soils have been mapped together as undifferentiated units because they are similar in suitability and in management required. A profile of the Whitman soils is described under the Whitman series.

Ridgebury loam, 0 to 3 percent slopes (RbA).—Included with this soil in mapping were some areas of sandier soil, some areas without the compact layer, and small areas of Whitman soils.

Although stones have been removed from the surface, the use of this soil for hay and pasture is limited because of excessive moisture. Artificial drainage is needed if the soil is used for crops. The potential is good for wetland wildlife habitat. (Capability unit IIIw–63)

Ridgebury loam, 3 to 8 percent slopes (RbB).—This gently sloping soil is susceptible to only slight erosion. Surface stones have been removed from it. Included with it in mapping were areas of sandier soil, areas without the pan, and areas of the wetter Whitman soils.

Because of poor drainage, this soil has severe limitations for crops. It is suited to corn, hay, and pasture if artificially drained, and drainage outlets are more readily located in it than in Ridgebury loam, 0 to 3 percent slopes. It is a good source of core material for pond dams. (Capability unit IIIw–63)

Ridgebury very stony loam, 0 to 3 percent slopes (RdA).—This soil generally occurs as foot slopes of upland hills. The stones on it average a foot in diameter and are generally 5 to 30 feet apart. Included with it in mapping were small areas of Whitman soils and extremely stony areas of Ridgebury soils.

This soil is well suited to most trees, and it makes a good wetland wildlife habitat. It has few limitations for the construction of ponds below the ground level. (Capability unit VIIs–73)

Ridgebury very stony loam, 3 to 8 percent slopes (RdB).—Stones on this soil generally average a foot in diameter and are 5 to 30 feet apart. Included in mapping were some areas of Whitman soils and some areas of stonier Ridgebury soils.

Use of this soil is limited to woodland and to woodland wildlife habitat. (Capability unit VIIs–73)

Ridgebury and Whitman very stony loams, 0 to 3 percent slopes (RhA).—These soils occupy depressions and broad level areas. Surface stones average a foot in diameter and are 5 to 30 feet apart. They limit the use of modern farm equipment. The very poorly drained Whitman soils, which are usually ponded, are common in the mapped areas of this unit. Small areas without the pan that is in the Ridgebury soils were included in mapping, as well as some small, extremely stony areas.

The use of these soils is limited mainly to permanent pasture and to woodland. The potential is good for development of wetland and woodland wildlife habitats. There are few limitations for the construction of ponds below ground level. (Capability unit VIIs–74)

Ridgebury and Whitman very stony loams, 3 to 8 percent slopes (RhB).—Water is seldom ponded on these gently sloping soils. The Ridgebury soils are generally dominant in this unit. Included in mapping were some small steeper areas.

These soils are limited in use mainly to permanent pasture and to woodland wildlife habitat, and they are well suited to the latter use. (Capability unit VIIs–74)

Rock Outcrop

Rock outcrop (Ro) occurs on mountains, hilltops, and steep cliffs. Vegetation is sparse and consists mostly of mosses, lichens, and small scrubby trees. Rock outcrop has no value for farming, but it is beneficial in scenic and recreational areas. (Capability unit VIIIs–90)

Rumney Series

The Rumney series consists of poorly drained, nearly level soils that formed in deep, wet sand subject to seasonal flooding. Small areas of these soils are on flood plains of most rivers in the county. The native vegetation consists of alder, willow, red maple, and sedges.

A cultivated Rumney soil has 5 inches of very dark grayish-brown, granular fine sandy loam underlain by dark grayish-brown fine sandy loam mottled with rusty brown to a depth of 17 inches. The soil below this, to a depth of 48 inches, is grayish-brown and gray loamy fine sand blotched with red colors caused by excessive moisture. Below a depth of 20 inches, layers of sand, silt, and gravel are common in places.

Although saturated for much of the year, these rapidly permeable soils can be drained. They are severely limited for some kinds of recreation sites and for industrial and residential sites because of wetness and flooding.

Profile of Rumney fine sandy loam (slope of 2 percent) in red clover and timothy on a river flood plain one-fourth mile southwest of the junction of Jamestown Road and Route 140 in Belmont:

Ap—0 to 5 inches, very dark grayish-brown (10YR 3/2) fine sandy loam; weak, fine, granular structure; very friable; many roots; very strongly acid; clear, wavy boundary. 3 to 5 inches thick.

C1g—5 to 13 inches, dark grayish-brown (10YR 4/2) fine sandy loam with few, fine, distinct, yellowish-red (5YR 4/6) mottles; weak, fine, granular structure; very friable; many roots; very strongly acid; abrupt, smooth boundary. 6 to 9 inches thick.

C2g—13 to 17 inches, dark grayish-brown (10YR 4/2) fine sandy loam with common, fine, distinct, dark-brown (7.5YR 4/4) mottles; weak, fine, granular structure; very friable; many roots; strongly acid; abrupt, smooth boundary. 3 to 4 inches thick.

C3—17 to 26 inches, grayish-brown (2.5Y 5/2) fine sandy loam with many, medium, prominent, yellowish-red (5YR 4/6) mottles; massive; friable; many roots; strongly acid; clear, wavy boundary. 9 to 11 inches thick.

IIC4g—26 to 35 inches, gray (5Y 5/1) loamy fine sand with many, medium, prominent, yellowish-red (5YR 4/6) mottles; weak, fine, granular structure; very friable; few roots; very strongly acid; abrupt, smooth boundary. 8 to 9 inches thick.

IIC5—35 to 39 inches, grayish-brown (2.5Y 5/2) loamy fine sand with many, medium, prominent, yellowish-red (5YR 5/6) mottles; single grain; slightly sticky; few roots; very strongly acid; clear, wavy boundary. 3 to 5 inches thick.

IIC6g—39 to 48 inches, gray (5Y 5/1) loamy fine sand with many, medium, prominent, yellowish-red (5YR 5/6) mottles; single grain; slightly sticky; few roots; very strongly acid.

The Ap horizon has a hue of 10YR or 2.5Y, a value of 3 or 4, and a chroma of 1 or 2. The C horizon ranges from 3 to 6 in value and 1 to 4 in chroma. In most places mottles are close to the surface, but they may be absent in gray subsurface layers. Below a depth of 20 inches, layers of sand, silt, or gravel occur in some places. Drainage is centered on the poorly drained class but extends into the lower range of the somewhat poorly drained class. Reaction ranges from very strongly acid to slightly acid.

Rumney soils commonly adjoin Mixed alluvial land, wet. Their parent material is similar to that of Deerfield, Au Gres, and Scarboro soils. They are in a drainage sequence with the well drained Ondawa and the moderately well drained Podunk soils.

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Rumney fine sandy loam (Ru).—This soil generally occurs as narrow strips along rivers and at the edge or foot of adjoining terrace slopes. Included in mapping were small, very poorly drained areas and small areas of finer textured soil.

This soil is waterlogged and subject to frequent flooding. If it is cultivated, artificial drainage is necessary, but outlets are difficult to obtain because the soil is at about the same level as the adjacent streams. It is suitable for woodland wildlife habitat. (Capability group IIIw–13)

Scarboro Series

The Scarboro series consists of very poorly drained, nearly level sandy soils in depressions on sand plains and terraces, mainly in the eastern, central, and western parts of the county. These soils formed in layers of sand and gravel and have a surface layer of black muck or black fine sandy loam. They are saturated by a high water table most of the year. The vegetation consists of alder, willow, white ash, red maple, reeds, and rushes.

A wooded Scarboro soil has a thin layer of fresh pine needles and hardwood leaves over 1½ inches of partly decomposed needles and leaves underlain by 8 to 10 inches of black fine sandy loam. The soil below, to a depth of 3 feet or more, consists of layers of light olive-gray and light-gray sand of varying texture.

Profile of Scarboro fine sandy loam (slope of 2 percent) in woods near the junction of Route 28 and North Cress Road in Alton:

O1—1¾ to 1½ inches, fresh pine needles and hardwood leaves.
O2—1½ inches to 0, partly decomposed needles and leaves.
A1—0 to 10 inches, black (10YR 2/1) fine sandy loam; massive; sticky; many roots; very strongly acid; abrupt, smooth boundary. 8 to 10 inches thick.
IIC1g—10 to 15 inches, light olive-gray (5Y 6/2) coarse and medium sand with few, fine, prominent, yellowish-brown (10YR 5/4) mottles; massive, breaking to single grain; weakly cemented; no roots; strongly acid; abrupt, smooth boundary. 4 to 6 inches thick.
IIC2g—15 to 33 inches, light-gray (5Y 7/2) sand; many, fine, distinct, yellowish-brown (10YR 5/4) mottles that become coarser with depth; some lenses of coarse sand; massive, breaking to single grain; nonsticky; no roots; strongly acid; present water table at 30 inches.

The texture of the A horizon is fine sandy loam or sandy loam. In some places the A1 horizon is as much as 12 inches thick. The texture of the subsurface horizons ranges from gravel to fine sandy loam. The colors of the C horizon are 5Y and 2.5Y in hue, 4 to 7 in value, and 0, 1, or 2 in chroma. Reaction ranges from very strongly acid to slightly acid.

Scarboro soils adjoin the droughty Hinckley and Windsor soils and the poorly drained Au Gres soils. They are in a drainage sequence with those soils and the Deerfield soils.

Scarboro fine sandy loam (Sc).—This soil is generally in depressions that are saturated most of the year and are difficult to drain. Included with it in mapping were small areas of Au Gres soils.

Because of the high water table, this soil is poorly suited to cultivated crops and to hay or pasture. Drainage would improve it for hay or pasture. If outlets are available, it can be drained because it has rapid to very rapid permeability. It generally is a good site for a dugout pond and is suitable for woodland and wetland wildlife habitats. Wetness severely limits the use for recreational, industrial, and residential purposes. (Capability unit Vw–24)

Shapleigh Series

The Shapleigh series consists of somewhat excessively drained, shallow, strongly acid soils that formed in shallow glacial till. These gently sloping to steep soils are on the crests and sides of hills and mountains throughout the county. Red spruce and white pine are the common merchantable trees growing on these soils.

A plowed Shapleigh soil has a surface layer of very dark grayish-brown, granular sandy loam about 7 inches thick. The subsoil is yellowish-brown sandy loam that grades to light yellowish-brown loamy sand at a depth of about 10 inches. This is underlain by bedrock at a depth of 17 inches.

Shapleigh soils are somewhat droughty, for they are rapidly permeable and are shallow above bedrock. The shallowness to bedrock is a severe limitation to many nonfarm uses.

Profile of Shapleigh very rocky sandy loam (slope of 10 percent) in woods one-half mile west of Dolloff Cabins in Meredith:

Ap—0 to 7 inches, very dark grayish-brown (10YR 3/2) sandy loam; weak, fine, granular structure; friable; many roots; medium acid; abrupt, smooth boundary. 6 to 8 inches thick.
B21—7 to 10 inches, yellowish-brown (10YR 5/6) sandy loam with some strong-brown (7.5YR 5/6) cemented aggregates; weak, fine, granular structure; friable; many roots; 5 to 10 percent coarse fragments; slightly acid; clear, wavy boundary. 2 to 4 inches thick.
B22—10 to 17 inches, light yellowish-brown (2.5Y 6/4) loamy sand; massive, breaking to weak, fine, granular structure; very friable; few roots; 2 to 4 percent coarse fragments; slightly acid; abrupt, smooth boundary. 7 to 14 inches thick.
R—17 inches, granitic bedrock.

The texture of the A horizon is sandy loam or fine sandy loam. That of the subsurface horizon, below a depth of 12 inches, is coarse sandy loam, loamy sand, or loamy coarse sand, and in some places this horizon is gravelly. Coarse fragments make up 5 to 60 percent of the soil mass. Colors of the B horizon are hues of 7.5YR, 10YR, and 2.5 Y, and they range from 4 to 8 in value and 3 to 6 in chroma. Hues of 10YR and 2.5Y are common in the C horizon where it is present. The soil thickness over bedrock averages 16 inches but ranges from 10 to 20 inches. The profile generally has an A–B–R horizon sequence, but a deeper profile of this series may have a thin, coarse-textured C horizon. Reaction ranges from extremely acid to medium acid.

Neighboring soils in the same drainage sequence as Shapleigh soils are the moderately well drained Acton, the well drained Paxton, and the somewhat excessively drained Gloucester soils. Other soils in the drainage sequence are the poorly drained Ridgebury and the very poorly drained Whitman soils.

In Belknap County, Shapleigh soils are mapped in complexes with small areas of Gloucester soils because they are so intermingled it is not practical to show them separately on a map of the scale used. These soils formed over a wavy irregular surface of bedrock. The Shapleigh soils are the shallower; they formed in material less than 20 inches thick. A profile of Gloucester soil is described under the Gloucester series.

Shapleigh-Gloucester sandy loams, 3 to 8 percent slopes (SgB).—These soils are on uplands. About 60 percent of this complex consists of the Shapleigh soils, which are shallow. Included in mapping were areas that have a reddish-brown to yellowish-red layer at a depth of 6 to 10 inches and areas that have yellowish-red to strong-brown colors throughout the subsoil. Also included were small areas of finer textured soil and areas that are less strongly sloping.

These soils are suited to cultivated crops and to hay and pasture, although the Shapleigh soils are somewhat droughty. The rock outcrops do not interfere with cultivation. There is a moderate erosion hazard, which requires conservation practices. The potential is fairly good for openland and woodland wildlife habitats. (Capability unit IIe–56)

Shapleigh-Gloucester sandy loams, 8 to 15 percent slopes (SgC).—These soils are like Shapleigh-Gloucester sandy loams, 3 to 8 percent slopes, except for the stronger slopes and for the thinner surface layer as a result of erosion. Included in mapping were areas of finer textured soil and areas that have a redder subsoil.

These soils are suited to hay and pasture, and some areas are suited to cultivated crops, although the Shapleigh soils are somewhat droughty. Cultivated crops can be grown where the surface is not too uneven for erosion control and the soils are not too shallow. There is a fairly good potential for openland and woodland wildlife habitats. (Capability unit IIIe–56)

Shapleigh-Gloucester very rocky sandy loams, 3 to 15 percent slopes (ShC).—These soils are like the Shapleigh-Gloucester sandy loams, 3 to 8 percent slopes, except for the more numerous rock outcrops and surface stones and the steeper slopes. The Shapleigh soils, which are shallow, make up about 70 percent of the complex. Included in mapping were Acton and Ridgebury soils in depressions.

Rock outcrops, surface stones, and droughtiness are the main limitations for farming. Consequently, most of the acreage is in timber. A small acreage is used for commercial production of blueberries. (Capability unit VIs–57)

Shapleigh-Gloucester very rocky sandy loams, 15 to 25 percent slopes (ShD).—Except for the steeper slopes and the more numerous rock outcrops and surface stones, these soils are similar to Shapleigh-Gloucester sandy loams, 3 to 8 percent slopes. Included in mapping were small areas that have fewer rock outcrops and some areas from which surface stones have been cleared.

Strong slopes, rock outcrops, and surface stones are severe limitations. In the past much of the acreage was in permanent pasture. A small acreage is now used for commercial production of blueberries. These soils are fairly well suited to use as woodland.

Along lake shores that are built up intensively with summer cottages, the pollution of lake water is a risk unless there is a public sewage disposal system. (Capability unit VIs–57)

Shapleigh-Gloucester very rocky sandy loams, 25 to 60 percent slopes (ShE).—These soils are much steeper and have more rock outcrops and surface stones than Shapleigh-Gloucester sandy loams, 3 to 8 percent slopes. Included in mapping were small areas that have fewer surface stones and rock outcrops and some areas from which surface stones have been removed. Also included were some areas of finer textured soil.

Steep slopes, rock outcrops, and surface stones limit the use of these soils mainly to woodland, but even for this purpose, the use of equipment is restricted. (Capability unit VIIs–57)

Shapleigh-Gloucester extremely rocky sandy loams, 8 to 25 percent slopes (SoD).—This mapping unit is 25 to 50 percent rock outcrops, 30 to 50 percent Shapleigh soil, and 10 to 20 percent Gloucester soil. The Gloucester is the deeper soil. Small areas of less rocky soil and pockets of wetter soil were included in mapping. Many of the wet spots are common in the less strongly sloping areas. Small areas that are as much as 90 percent rock outcrop were included, as well as extremely rocky areas having slopes of less than 8 percent. Also included were areas of finer textured soil, areas that have a redder layer in the upper part of the subsoil, and areas in which yellowish-red to strong-brown colors occur throughout the subsoil.

These soils are used mainly as woodland, but management is difficult because of the many rock outcrops, surface stones, and boulders. In addition, tree growth is limited by droughtiness. The extreme rockiness severely limits farm and nonfarm uses. (Capability unit VIIs–58)

Shapleigh-Gloucester extremely rocky sandy loams, 25 to 60 percent slopes (SoE).—These soils are like Shapleigh-Gloucester extremely rocky sandy loams, 8 to 25 percent slopes, except for the steeper slopes and fewer inclusions of wet spots. Included in mapping were some areas of finer textured soil, some areas in which the upper part of the subsoil is redder, and some areas in which yellowish-red to strong-brown colors occur throughout the subsoil.

These soils are severely limited for most purposes. Less steep areas adjoining more desirable soils are managed as woodland. Access is poor, however, and roads are difficult to construct. (Capability unit VIIs–58)

Suncook Series

The Suncook series consists of nearly level soils that formed in deep, sandy and gravelly river deposits. These soils are generally in narrow strips bordering streams and rivers and are often flooded. Elm, red maple, and willow are the main trees growing on them.

A Suncook soil has about 6 inches of brown loamy sand underlain by layers of pale-brown and brown sand and loamy sand to a depth of 28 inches. This is underlain by 8 inches of very dark grayish-brown fine sandy loam, below which is brown loamy sand to a depth of 44 inches.

These soils are very rapidly permeable and are droughty. They are not suitable for crops and pasture unless they are irrigated and protected from flooding and erosion.

Profile of Suncook loamy sand (slope of 1 percent):

Ap—0 to 6 inches, brown (10YR 5/3) loamy sand; weak, fine, granular structure; very friable; many roots; strongly acid; abrupt, smooth boundary. 6 to 8 inches thick.

C1—6 to 8 inches, pale-brown (10YR 6/3) medium sand; single grain; loose; many roots; medium acid; abrupt, smooth boundary. 1 to 2 inches thick.

IIC2—8 to 11 inches, brown (10YR 5/3) loamy sand; weak, medium, granular structure; very friable; common roots; medium acid; abrupt, smooth boundary. 3 to 4 inches thick.

IIC3—11 to 13 inches, pale-brown (10YR 6/3) medium sand; single grain; loose; common roots; medium acid; abrupt, smooth boundary. 2 to 3 inches thick.

IIIC4—13 to 16 inches, very dark grayish-brown (10YR 3/2) loamy sand; weak, medium, granular structure; very friable; common roots; medium acid; abrupt, smooth boundary. 3 to 4 inches thick.

IIIC5—16 to 28 inches, brown (10YR 5/3) loamy sand; weak, medium, granular structure; very friable; few roots; medium acid; abrupt, smooth boundary. 12 to 17 inches thick.

IVC6—28 to 37 inches, very dark grayish-brown (10YR 3/2) fine sandy loam; weak, fine, granular structure; very friable; few roots; medium acid; abrupt, smooth boundary. 7 to 8 inches thick.

IVC7—37 to 44 inches, brown (10YR 5/3) loamy sand; weak, medium, granular structure; very friable; few roots; strongly acid.

In some places layers of fine sandy loam and gravel occur below a depth of 12 inches. Mottling occurs in places below a depth of 18 inches. The color of the C horizon is 7.5YR or 10YR, and it ranges from 2 to 6 in chroma. Reaction ranges from very strongly acid to medium acid.

Suncook soils are coarser textured than the well drained Ondawa soils, the moderately well drained Podunk soils, and the poorly drained Rumney soils, all of which are also on flood plains.

Suncook loamy sand (Sy).—Included in mapping were small areas of the finer textured, well drained Ondawa soil and the moderately well drained Podunk soil, as well as coarse river deposits.

This very rapidly permeable, droughty soil is subject to frequent flooding. It has a low potential for farming unless irrigated and protected from flooding and wind erosion. If these practices are applied, it can be used for silage corn and for hay and pasture. It has a limited potential for development of wildlife habitat and for forestry management. Flooding is a severe limitation to some recreational uses and to residential and industrial use. (Capability unit IIIs–16)

Whitman Series

The Whitman series consists of very poorly drained, stony sandy soils in depressions and broad level areas on uplands throughout most of the county. Many of these wet depressions are the sources of streams. The vegetation commonly consists of alder, gray birch, red maple, sedges, rushes, and cattails.

A forested very stony Whitman soil has about 2 inches of fresh and partly decayed needles and leaves over 8 inches of black, granular loam. The material below, to a depth of 17 inches, is gray and dark-gray fine sandy loam. Underlying this are layers of dark-gray and yellowish-red gravelly loam to gravelly sandy loam. The lower layers are firm and hard to dig.

Whitman soils are saturated by a high water table most of the year, and in places they are ponded during wet seasons. Consequently, most areas remain in trees. Wetness is the major limitation to many uses.

Profile of Whitman very stony loam (slope of 2 percent) in a forested area on the west side of Route 106 in Belmont close to the Laconia line:

O1—2 to 1½ inches, fresh pine needles and leaves.
O2—1½ inches to 0, partly decayed needles and leaves.
Ap—0 to 8 inches, black (10YR 2/1) loam; moderate, medium, granular structure; very friable; many roots; less than 5 percent gravel; about 3 to 15 percent coarse fragments greater than 10 inches in diameter; strongly acid; clear, wavy boundary. 7 to 9 inches thick.
A2g—8 to 14 inches, gray (5Y 5/1) fine sandy loam; massive; friable; few roots; less than 5 percent gravel; very strongly acid; abrupt, wavy boundary. 5 to 6 inches thick.
C1g—14 to 17 inches, dark-gray (5Y 4/1) fine sandy loam with horizontal streaks or mottling of yellowish red (5YR 5/6); massive, with tendency toward platiness; friable to firm; few roots; less than 5 percent gravel; strongly acid; clear, wavy boundary. 3 to 4 inches thick.
C2xg—17 to 21 inches, dark-gray (5Y 4/1) gravelly fine sandy loam; moderate, medium, platy structure; firm; interior of plates is yellowish red (5YR 5/6); no roots; 15 to 20 percent gravel; very strongly acid; clear, wavy boundary. 4 to 5 inches thick.
C3xg—21 to 27 inches, mixed dark-gray (5Y 4/1) and yellowish-red (5YR 5/6) gravelly loam; moderate, thick, platy structure; firm; no roots; 15 to 20 percent gravel; strongly acid; clear, wavy boundary. 5 to 7 inches thick.
C4g—27 to 41 inches, mixed dark-gray (5Y 4/1) and yellowish-red (5YR 5/6) gravelly sandy loam; massive; friable; 15 to 20 percent gravel; strongly acid.

The texture of the A horizon is generally loam, but in places a 12-inch layer of muck is at the surface. The texture below the surface horizon, to a depth of 20 inches or more, ranges from sandy loam to loam. The texture below 20 inches ranges from loamy sand to loam. The color of the surface mineral horizon is black or very dark brown. The chroma of the gleyed horizons is 0 or 1. The mottles are generally few and fine, but, in places the number and size increase at a depth below 15 inches. Reaction ranges from very strongly acid to medium acid.

Adjoining the Whitman soils are the poorly drained Ridgebury soils, which generally have a very dark gray surface layer. Nearby are the better drained Charlton, Gloucester, Paxton, Acton, and Woodbridge soils, all of which are generally more strongly sloping.

Whitman very stony loam (Wc).—This soil occupies depressions and broad level areas. The surface stones on it prevent the use of farm equipment. They average a foot in diameter and generally are 5 to 30 feet apart. Included in mapping were some small areas free of surface stones and some sloping areas.

This soil is used for permanent pasture and woodland. It generally is a good site for a dugout pond and is well suited to the development of wetland and woodland wildlife habitats. (Capability unit VIIs–74)

Windsor Series

The Windsor series consists of deep, excessively drained, nearly level to very steep soils that formed in sand. These soils are chiefly in river valleys throughout the county, but they are not subject to flooding. Most areas have a forest cover of gray birch, red pine, and white pine.

A wooded Windsor soil has 1 to 2 inches of fresh and partly decomposed pine needles and twigs underlain by about 8 inches of dark-brown loamy sand. There is a sharp color change where this layer joins the upper part of the subsoil, which is yellowish-brown, granular loamy fine sand and which contains about 1 percent fine gravel. The subsoil grades to brownish-yellow, very loose loamy sand and contains about 10 percent fine gravel in the lower part. The substratum, below a depth of 25 inches, is distinctly yellow or pale-yellow loose fine sand that can be poured from the hands like salt.

Windsor soils are strongly acid. They have very rapid permeability and low available water capacity. Consequently, they are poorly suited to farming unless irrigated. There are no serious limitations to most nonfarm uses, although droughtiness is a limitation to development of wildlife habitat, and the steeper slopes are a moderate to severe limitation to some nonfarm uses such as tent sites and play areas.

Profile of Windsor loamy sand (slope of 2 percent) in a wooded area 1.8 miles west of Belmont village:

O1—1 to ½ inch, fresh pine needles and twigs.
O—½ inch to 0, partly decomposed pine needles and twigs.
Ap—0 to 8 inches, dark-brown (10YR 3/3) loamy sand; weak, fine, granular structure; very friable; many roots;

strongly acid; abrupt, smooth boundary. 6 to 8 inches thick.

B21—8 to 13 inches, yellowish-brown (10YR 5/8) loamy fine sand; weak, fine, granular structure; very friable; many roots; strongly acid; clear, wavy boundary. 3 to 8 inches thick.

B22—13 to 21 inches, yellowish-brown (10YR 5/6) loamy fine sand; weak, fine, granular structure; very friable; common roots; approximately 1 percent fine gravel; very strongly acid; clear, wavy boundary. 6 to 9 inches thick.

B3—21 to 25 inches, brownish-yellow (10YR 6/6) loamy sand; single grain; loose; few roots; 10 percent fine gravel; very strongly acid; clear, wavy boundary. 3 to 5 inches thick.

C1—25 to 30 inches, yellow (2.5Y 7/6) fine sand; single grain; loose; few roots; 1 percent fine gravel; very strongly acid; clear, wavy boundary. 4 to 6 inches thick.

C2—30 to 40 inches, pale-yellow (2.5Y 7/4) fine sand; single grain; loose; no roots; less than 5 percent fine gravel; very strongly acid.

The texture of the surface horizon ranges from sand to loamy fine sand. The color of the upper B horizon has a hue of 7.5YR to 2.5Y, a value of 3 to 5, and a chroma of 4 to 8. A hue of 10YR or 2.5Y is common in the substratum, with a value of 4 to 8 and a chroma of 2 to 8. A discontinuous A2 horizon (bleicherde), one-half inch or less thick, is present in some places. The content of fine gravel in the subsoil and substratum may be as much as 20 percent by volume. Reaction ranges from very strongly acid to medium acid.

The stone-free surface of Windsor soils is in startling contrast to the stony surface of the neighboring Gloucester and Paxton soils.

Windsor loamy sand, 0 to 3 percent slopes (WdA).—Gravelly spots and areas of wetter Deerfield soils were included with this soil in mapping. Also included were areas that are redder in the upper part of the subsoil.

Most of this soil is wooded, but it is suited to corn, alfalfa, and truck crops. The response is fair to good if the soil is irrigated and otherwise well managed. Some areas are used for residential and industrial development, to which there are few limitations. (Capability unit IIIs–26)

Windsor loamy sand, 3 to 8 percent slopes (WdB).—This is the most extensive of the Windsor soils. Included in mapping were some gravelly areas and some areas that are redder in the upper part of the subsoil.

Except for a few cultivated areas, this soil is wooded. Because of droughtiness and low natural fertility, it is poorly suited to crops or to hay or pasture unless it is irrigated and otherwise well managed. Unprotected areas are subject to wind and water erosion. Droughtiness limits the growth of lawns. (Capability unit IIIs–26)

Windsor loamy sand, 8 to 15 percent slopes (WdC).—This sloping soil has lost some of its original surface layer through erosion. Otherwise, it is similar to Windsor loamy sand, 0 to 3 percent slopes. Most of the slopes are short. Small gravelly areas and areas that are redder in the upper part of the subsoil were included in mapping, as well as small areas that have some surface stones.

Most of this soil is wooded, and most of it is poorly suited to cultivation. Droughtiness and low natural fertility are the major limitations. (Capability unit IVs–26)

Windsor loamy sand, 15 to 60 percent slopes (WdE).—This soil occupies terrace breaks along most of the major streams in the county. Some areas that are redder in the upper part of the subsoil were included in mapping.

Most of this soil is wooded. It is too steep for cultivation and for many nonfarm uses. It can be used for trees or wildlife habitat. Erosion is a severe hazard if this soil is unprotected by vegetation. (Capability unit VIIs–26)

Woodbridge Series

The Woodbridge series consists of moderately well drained, nearly level to hilly soils that formed in deep, stony glacial till on uplands. These soils have a pan layer that is hard to dig with a spade. They are mainly in the central and southern sections of the county. The native vegetation consists of white pine, white birch, red maple, sugar maple, red oak, and hemlock.

A forested very stony Woodbridge soil has about 1½ inches of fresh and partly decayed pine needles over 4 inches of very dark brown, crumbly loam. The subsoil, to about 11 inches in depth, is dark-brown loam and contains a few rock fragments. Beneath this layer, dark yellowish-brown fine sandy loam extends to a depth of about 18 inches. This is underlain by a 2-inch layer of light yellowish-brown loamy sand that has a few, fine, distinct, strong-brown mottles. Below a depth of 20 inches the soil is firm, compact, light olive-brown sandy loam distinctly mottled with yellowish red. This layer contains a few small rock fragments.

These soils are often wet early in spring and late in fall. They normally supply adequate moisture to plants. Permeability is moderate through the soil above the pan but slow through the pan. Water moves over the pan and comes to the surface downslope as seep spots. Seasonal wetness and the slowly permeable subsoil limit the use for industrial and residential sites.

Profile of Woodbridge very stony loam (slope of 4 percent) in woods in Gilmanton:

O1—1½ inches to 1 inch, fresh pine needles.

O2—1 inch to 0, partly decayed pine needles.

A1—0 to 4 inches, very dark brown (10YR 2/2) loam; weak, fine, granular structure; very friable; many roots; approximately 5 percent gravel and stones; strongly acid; clear, wavy boundary. 3 to 5 inches thick.

B21—4 to 11 inches, dark-brown (7.5YR 4/4) loam; weak, fine, granular structure; friable; many roots; approximately 1 percent coarse fragments; strongly acid; clear, wavy boundary. 5 to 8 inches thick.

B22—11 to 18 inches, dark yellowish-brown (10YR 4/4) fine sandy loam; weak, fine, granular structure; friable; few roots; less than 5 percent coarse fragments; strongly acid; abrupt, smooth boundary. 5 to 8 inches thick.

A2—18 to 20 inches, light yellowish-brown (2.5Y 6/4) loamy sand with few, fine, distinct, strong-brown (7.5YR 5/6) mottles; weak, fine, granular structure; very friable; few roots; approximately 5 percent coarse fragments; strongly acid; abrupt, smooth boundary. 1 to 2 inches thick.

Cx—20 to 32 inches, light olive-brown (2.5Y 5/4) sandy loam with common, medium, prominent, yellowish-red (5YR 4/6) mottles; moderate, medium, platy structure; very firm; few roots concentrated in gray (2.5Y 5/0) polygonal cracks; 5 to 10 percent coarse fragments; strongly acid.

The texture of the surface layer is loam or fine sandy loam. The texture of the B horizon and the fragipan ranges from sandy loam to loam. Coarse fragments make up to 2 to 30 percent of the soil mass. The matrix color of the B horizon ranges from 7.5YR to 2.5Y in hue, from 3 to 5 in value, and from 2 to 4 in chroma. The depth to the fragipan ranges from 16 to 36 inches. The depth to distinct mottling ranges from 12 to 24 inches. Drainage is predominantly in the moderately well drained class but extends into the upper range of the

somewhat poorly drained class. Reaction ranges from strongly acid to medium acid.

Woodbridge soils are members of a drainage sequence with the well-drained Paxton, the poorly drained Ridgebury, and the very poorly drained Whitman soils. The moderately well drained Acton soils are similar to the Woodbridge soils but are coarser textured and do not have a pan.

Woodbridge loam, 0 to 8 percent slopes (WoB).—This soil is like the one described as representative of the series, except that it has a thicker surface layer and, in the more nearly level areas, mottling is more pronounced in the lower part of the subsoil. The surface layer is generally free of stones and consists of about 9 inches of dark grayish-brown loam. Included with this soil in mapping were small, more poorly drained areas that have a darker surface layer and mottling close to the surface. Also included were some areas without a compact layer, some areas that are redder in the upper part of the subsoil, and some areas in which there are a few stones 30 to 100 feet apart.

Wetness is the major limitation. Water tends to pond for short periods on the nearly level areas. This soil is especially well suited to a grass-clover mixture for hay and pasture. If artificially drained, it is suited to corn, potatoes, apples, and truck crops. It is one of the best soils in the county for timber. It can be developed as open-land or woodland wildlife habitats and is suitable for parks and picnic areas. (Capability unit IIw–62)

Figure 4.—Field of Woodbridge very stony loam used for permanent pasture.

Woodbridge loam, 8 to 15 percent slopes (WoC).—This soil is similar to Woodbridge loam, 0 to 8 percent slopes, except that it has a thinner surface layer due to erosion, and the mottling is deeper in the profile. Water usually does not accumulate on the surface but moves downslope over the pan and seeps out at lower levels. Because the slopes are long, the drainage is generally more uniform than in the less strongly sloping Woodbridge soils, which have shorter slopes. Included with this soil in mapping were some areas that are moderately steep and some that have a redder layer in the upper part of the subsoil.

This soil is well suited to hay, pasture, and trees. It is also suited to the development of openland and woodland wildlife habitats. Runoff is somewhat excessive, and conservation measures are needed to control erosion if the soil is used for cultivated crops. Erosion is a severe hazard during construction and landscaping. (Capability unit IIIe–62)

Woodbridge very stony loam, 0 to 8 percent slopes (WvB).—This soil generally occurs on hill crests and in depressions on uplands. Stones 10 to 24 inches in diameter and 5 to 30 feet apart are on the surface. Spots of Ridgebury and Paxton soils, as well as areas that are redder in the upper part of the subsoil, were included in mapping.

This moderately well drained stony soil is well suited to use as woodland. If drainage and removal of stones are feasible and the soil is otherwise well managed, it can be used for crops and pasture (fig. 4). It is suitable for woodland wildlife habitat. (Capability unit VIs–72)

Woodbridge very stony loam, 8 to 15 percent slopes (WvC).—This soil has long slopes. It occurs as broad areas on uplands and as narrow strips on foot slopes. Included with it in mapping were areas that are moderately steep, areas that are stonier, and areas that are redder in the upper part of the subsoil.

This soil is well suited as woodland and to the development of woodland wildlife habitat. Some of it is suitable for pasture. (Capability unit VIs–72)

Use and Management of the Soils

In this section the soils are discussed in relation to their use and suitability for farming, woodland management, wildlife management, engineering, and recreational and community development.

Soils in Farming

The soils of Belknap County vary widely in their suitability for plants and in the kind of management needed. Their texture ranges from loam to gravelly loamy sand. Some of the soils are well supplied with organic matter; some are not. Some need artificial drainage if they are used for cultivated crops. Most of the soils need lime and fertilizer, but in varying amounts.

The tilth of the surface soil and the supply of plant nutrients are very important when crops are young. The subsoil also must furnish some nutrients and a great deal of water. The sandy subsoil of the droughty Hinckley and Windsor soils can supply only a small amount of nu-

trients and water for plant growth. In contrast, the loamy subsoil of the Charlton and Paxton soils can supply adequate amounts of nutrients and water for most crops.

Many soil properties affect yields. Recognizing the specific characteristics and qualities of soils is important in planning their use and management. Some soil properties can be changed for the better. For example, acid soils can be limed so that alfalfa can be grown. Some naturally wet soils, such as Au Gres loamy sand, can be drained to improve aeration and permit early preparation of seedbeds. Soils that are naturally low in organic matter can be improved by applications of manure. Irrigation can correct moisture deficiencies in soils such as the Windsor loamy sands.

Other soil properties are not so easily changed. Slope, for example, and the physical character of the subsoil are things we more or less have to live with; but erosion and excess runoff can be controlled and tilth improved by terracing the slopes, keeping waterways in sod, and using suitable cropping systems.

It is important to know the problems of managing each soil because no single cropping system, fertilizer treatment, or erosion control plan is good for all the soils in the county. Practices that are good on one farm may not be good on an adjoining farm. There are many differences among soils, and different management plans are needed to get the best yields.

Capability groups of soils

Capability classification is the grouping of soils to show, in a general way, their suitability for most kinds of farming. It is a practical classification based on the limitations of the soils, the risk of damage when they are used, and the way they respond to treatment. The classification does not apply to most horticultural crops or to rice and other crops that have special requirements. The soils are classified according to degree and kind of permanent limitation, but without consideration of major and generally expensive reclamation or land-forming that would change the slope, depth, or other characteristics of the soils.

In the capability system, all kinds of soils are grouped at three levels—the capability class, the subclass, and the unit. These are discussed in the following paragraphs.

Capability Classes, the broadest grouping, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use, defined as follows:

Class I. Soils that have few limitations that restrict their use.

Class II. Soils that have some limitations that reduce the choice of plants or require moderate conservation practices.

Class III. Soils that have severe limitations that reduce the choice of plants, or require special conservation practices, or both.

Class IV. Soils that have very severe limitations that restrict the choice of plants, require very careful management, or both.

Class V. Soils that are subject to little or no erosion but have other limitations, impractical to remove, that limit their use largely to pasture, woodland, or wildlife food and cover.

Class VI. Soils that have severe limitations that make them generally unsuitable for cultivation and limit their use largely to pasture, woodland, or wildlife food and cover.

Class VII. Soils that have very severe limitations that make them unsuitable for cultivation and that restrict their use largely to grazing, woodland, or wildlife.

Class VIII. Soils and landforms that have limitations that preclude their use for commercial plant production and restrict their use to recreation, wildlife, water supply, or to esthetic purposes.

Capability Subclasses are soil groups within one class; they are designated by adding a small letter *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only subclasses indicated by *w*, *s*, and *c*, because the soils in it are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture, range, woodland, wildlife, or recreation.

Capability Units are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe–5 or IIIe–5. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation, and the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph. The Arabic numeral specifically identifies the capability unit within each subclass.

Capability unit numbers are generally assigned locally but are part of a statewide system. All of the units in the system are not represented by the soils in Belknap County; therefore, the numbers are not consecutive.

Management by capability units

In the following descriptions of capability units, the features of the soils that affect farming are described and suggestions are given for the use and management of the soils. It is assumed that lime and fertilizer will be applied in the proper amounts for a specific crop if soil tests indicate the need.

For more detailed information on the management of the soils, consult the local representatives of the Soil Conservation Service, the County Agricultural Extension Service, or the New Hampshire Agricultural Experiment Station.

CAPABILITY UNIT I–1

Ondawa fine sandy loam, high bottom, is the only soil in this capability unit. It is a deep, level or nearly level, well-drained soil on alluvial plains. Most of it is flooded only when the adjoining streams are extremely high, but

areas that are behind the Franklin Falls flood control dam are flooded when the dam is closed.

This soil generally holds sufficient moisture for plants, although water drains rapidly through it. It is very strongly acid to slightly acid.

Corn, truck crops, small grains, grasses, and legumes are suitable crops. Managing crop residue and keeping tillage to a minimum are means of maintaining organic-matter content. Ponding, which occurs when the soil is frozen, can be eliminated by smoothing. A strip of sod along a streambank is effective in controlling streambank erosion.

CAPABILITY UNIT IIe–5

Charlton loam, 3 to 8 percent slopes, is the only soil in this capability unit. It is a deep, well-drained soil that holds enough moisture and nutrients for plants, although water moves readily through it. It is very strongly acid.

This soil is well suited to apple orchards and to corn, small grains, grasses, and legumes. It can be row cropped continuously if it is terraced or tilled on the contour or stripcropped. These practices are needed to control erosion. A suitable rotation consists of a row crop and winter cover for 1 year, followed by hay crops for 2 years or more.

CAPABILITY UNIT IIe–6

Paxton loam, 0 to 8 percent slopes, is the only soil in this unit. It is a deep, well-drained soil on uplands. A pan layer at a depth of about 2 feet restricts the downward movement of water and thereby increases runoff and creates an erosion hazard.

The available water capacity is moderate. The reaction is strongly acid, but nutrients are readily available to crops.

This soil is well suited to apple orchards, corn, small grains, grasses, and legumes. A commonly used cropping system consists of 2 years of row crops and winter cover, followed by 2 or more years of hay. Because of prolonged wetness in spring, tillage operations have to be delayed. Contour tillage, stripcropping, and construction of terraces and diversions are means of controlling erosion if cultivated crops are grown.

CAPABILITY UNIT IIe–56

Shapleigh-Gloucester sandy loams, 3 to 8 percent slopes, are the only soils in this unit. They occur as a complex in which the shallow Shapleigh soil is intermingled with pockets of the deeper Gloucester soil. These soils are somewhat excessively drained and are droughty.

The reaction is extremely acid to medium acid. Permeability is rapid. In places the depth to bedrock is less than 18 inches. When the soil is thawing in spring, water flows downslope over the bedrock and comes to the surface in seepage spots.

Corn, truck crops, small grains, grasses, and legumes are suitable crops. Without stripcropping and diversions, a suitable cropping system consists of a row crop and winter cover for 1 year, followed by hay for 3 or more years. If diversions and stripcropping are used, the cropping system can consist of 2 years of row crops and winter cover, followed by 2 or more years of hay.

Contour tillage, stripcropping, and construction of diversions reduce the hazard of erosion on long slopes. The few scattered rock outcrops do not seriously limit tillage.

CAPABILITY UNIT IIw–12

Podunk fine sandy loam is the only soil in this unit. It is a deep, moderately well drained, nearly level soil on sandy flood plains. Streambank erosion is a hazard in places, and flooding is a hazard early in spring and late in fall.

Permeability is rapid, but moisture is readily available to crops during dry months. The reaction is medium acid.

This soil is suited to hay and pasture crops. Silage corn and late vegetables grow fairly well. A suitable cropping system consists of a row crop and winter cover for 1 year, followed by hay for 3 or more years. Where flooding is not a problem, continuous row cropping with winter cover is possible if artificial drainage is installed. If legumes are grown, they should be the kind that can withstand wetness and winterkill.

Smoothing would eliminate some wet spots and improve workability. A permanent strip of sod along streams reduces the hazard of streambank erosion. Protection from grazing is advisable early in spring or whenever the soil is wet.

CAPABILITY UNIT IIw–22

This unit consists of deep, moderately well drained, level to gently sloping sandy soils of the Deerfield series. These soils are on terraces and sand plains. They have a fluctuating water table. The erosion hazard is slight to moderate.

Permeability is rapid. The available water capacity is low. The reaction is very strongly acid, and the nutrient-supplying capacity is low.

These soils are suited to corn and truck crops, but artificial drainage is necessary. If legumes are grown, they should be the kind that can withstand seasonal wetness and winterkill. Level areas that are drained can be used for row crops continuously if winter cover is grown. For graded strips in gently sloping areas, a suitable cropping system consists of 2 years of row crops and winter cover, followed by 2 or more years of hay.

The soils in this unit have to be worked later in spring than most well-drained soils. Tile drainage is commonly used to allow earlier tillage and a wider choice of crops.

CAPABILITY UNIT IIw–52

Acton and Acton firm substratum, fine sandy loams, 0 to 8 percent slopes, are the only soils in this capability unit. They are deep, moderately well drained soils on uplands. Seepage water and a temporary high water table are the major limitations.

Water moves freely through the fine sandy loam, but slowly through the firm substratum. The available water capacity is low. The reaction is strongly acid to medium acid.

Corn, small grains, and legumes are suitable crops. If diversions are constructed or artificial drainage is installed, a suitable cropping system consists of 2 years of row crops and winter cover, followed by 2 or more years of hay. If legumes are grown, they should be the kind that can withstand seasonal wetness and winterkill.

These soils are wet in spring and late fall and for short periods after heavy rains. Artificial drainage increases the choice of crops and allows earlier tillage. The hazard of erosion ranges from slight to moderate. On long slopes erosion can be controlled by constructing diversions and by stripcropping. Most surface stones have been removed,

but subsurface stones occasionally interfere with tillage. Protection from grazing is advisable early in spring or whenever the soil is wet.

CAPABILITY UNIT IIw–62

Woodbridge loam, 0 to 8 percent slopes, is the only soil in this unit. It is a deep, moderately well drained soil that formed in compact upland glacial till. A pan layer at a depth of about 2 feet restricts the downward movement of water.

Permeability is moderate above the pan layer but slow in it. During dry seasons, this soil supplies adequate moisture to plants. It is strongly acid. Applied nutrients are held readily available for plants.

Cultivated crops can be grown, and small grains, grasses, and legumes grow well. Legumes should be winter hardy and able to withstand seasonal wetness. A suitable cropping system consists of a row crop and winter cover for 1 year, followed by hay for 3 or more years.

This soil is wet in spring and late in fall and for short periods after heavy rains. It stays wet longer than most well-drained soils. Artificial drainage increases the choice of crops and allows earlier tillage and more intensive cropping. Diversions and stripcropping help to control erosion on long slopes. Most surface stones have been removed, but subsurface stones in a few places may interfere with tillage.

CAPABILITY UNIT IIs–55

Gloucester sandy loam, 3 to 8 percent slopes, is the only soil in this unit. It is a deep, somewhat excessively drained soil on uplands.

Water moves rapidly through this soil, and little moisture is available to plants during dry seasons. The reaction is strongly acid, and the natural fertility is low.

This soil is suited to truck crops, apple orchards, corn, small grains, grasses, and legumes. A suitable cropping system consists of a row crop and winter cover for 1 year, followed by hay for 3 or more years. Diversions and stripcropping reduce the hazard of erosion in cultivated fields. A few stones on the surface and in the soil may interfere with tillage.

CAPABILITY UNIT IIIe–5

Charlton loam, 8 to 15 percent slopes, is the only soil in this unit. It is a deep, well-drained soil on uplands.

Although this friable soil drains readily, it holds a good supply of moisture for plants and makes applied nutrients available. It is very strongly acid.

Apple orchards, corn, small grains, grasses, and legumes grow well on this soil. A good cropping system consists of 2 years of row crops and winter cover, followed by 2 or more years of hay. Stripcropping and construction of diversions are practices that control erosion and conserve moisture in cultivated fields. A few subsurface stones interfere with tillage.

CAPABILITY UNIT IIIe–6

Paxton loam, 8 to 15 percent slopes, is the only soil in this unit. It is a deep, well-drained soil that formed in compact glacial till on uplands. A pan, or compact layer, at a depth of about 22 inches is slowly permeable and restricts internal drainage.

This friable soil holds a good supply of moisture for plants and makes applied nutrients readily available. It is strongly acid.

Apple orchards, silage corn, grasses, and legumes grow well on this soil. Cultivated crops can be grown if erosion is controlled by a cropping system consisting of 2 years of row crops and winter cover, followed by 3 or more years of hay. Other conservation measures needed are stripcropping, drainage of seep spots, and construction of diversions and waterways (fig. 5).

CAPABILITY UNIT IIIe–55

Gloucester sandy loam, 8 to 15 percent slopes, is the only soil in this unit. It is a deep, somewhat excessively drained soil on uplands.

The reaction is very strongly acid. Permeability is rapid, and the available moisture capacity and nutrient capacity are low.

The risk of erosion limits the use of this soil for cultivated crops, and subsurface stones interfere with tillage. Silage corn, apple orchards, small grains, and deep-rooted grasses and legumes are suitable. A suitable cropping system consists of a row crop and winter cover for 1 year, followed by hay for 3 or more years. Even if this soil is heavily fertilized, yields are generally limited unless crops are irrigated. Diversions and contour stripcropping reduce the hazard of erosion on cultivated fields.

CAPABILITY UNIT IIIe–56

This unit consists of a complex of Shapleigh-Gloucester sandy loams, 8 to 15 percent slopes. The shallow Shapleigh soil is intermingled with pockets of the deeper Gloucester soil. These soils are somewhat excessively drained and are droughty.

The depth to bedrock in the Shapleigh soil ranges from 10 to more than 20 inches. Water moves rapidly over the undulating bedrock and comes to the surface in many seep spots. The reaction is extremely acid to medium acid.

Where the surface is smooth enough for stripcropping or the construction of diversions, this complex of soils is suited to a cropping system in which a row crop and winter cover are grown for 1 year, followed by grass for 3 or more years. Alfalfa can be grown in well fertilized areas of the deeper soils.

CAPABILITY UNIT IIIe–62

Woodbridge loam, 8 to 15 percent slopes, is the only soil in this unit. It is a deep, moderately well drained soil on uplands. A pan layer at a depth of 2 feet or less restricts the movement of water. The erosion hazard and a seasonal high water table are the main limitations.

Water moves freely through this soil above the pan but slowly through the pan. The reaction is strongly acid. The capacity to supply moisture and applied nutrients is adequate.

This soil is wet and cold until late in spring. It is suited to grasses and legumes that withstand a seasonal high water table and are resistant to winterkill. If erosion is controlled, other crops can be grown, but not corn or alfalfa. A suitable cropping system consists of a row crop and winter cover for 1 year, followed by hay for 3 years or more. If cultivated crops are grown, stripcropping and diversions reduce the risk of erosion.

CAPABILITY UNIT IIIw–13

Rumney fine sandy loam, the only soil in this unit, is a deep, nearly level, poorly drained soil along streams. It is saturated for long periods and is flooded seasonally.

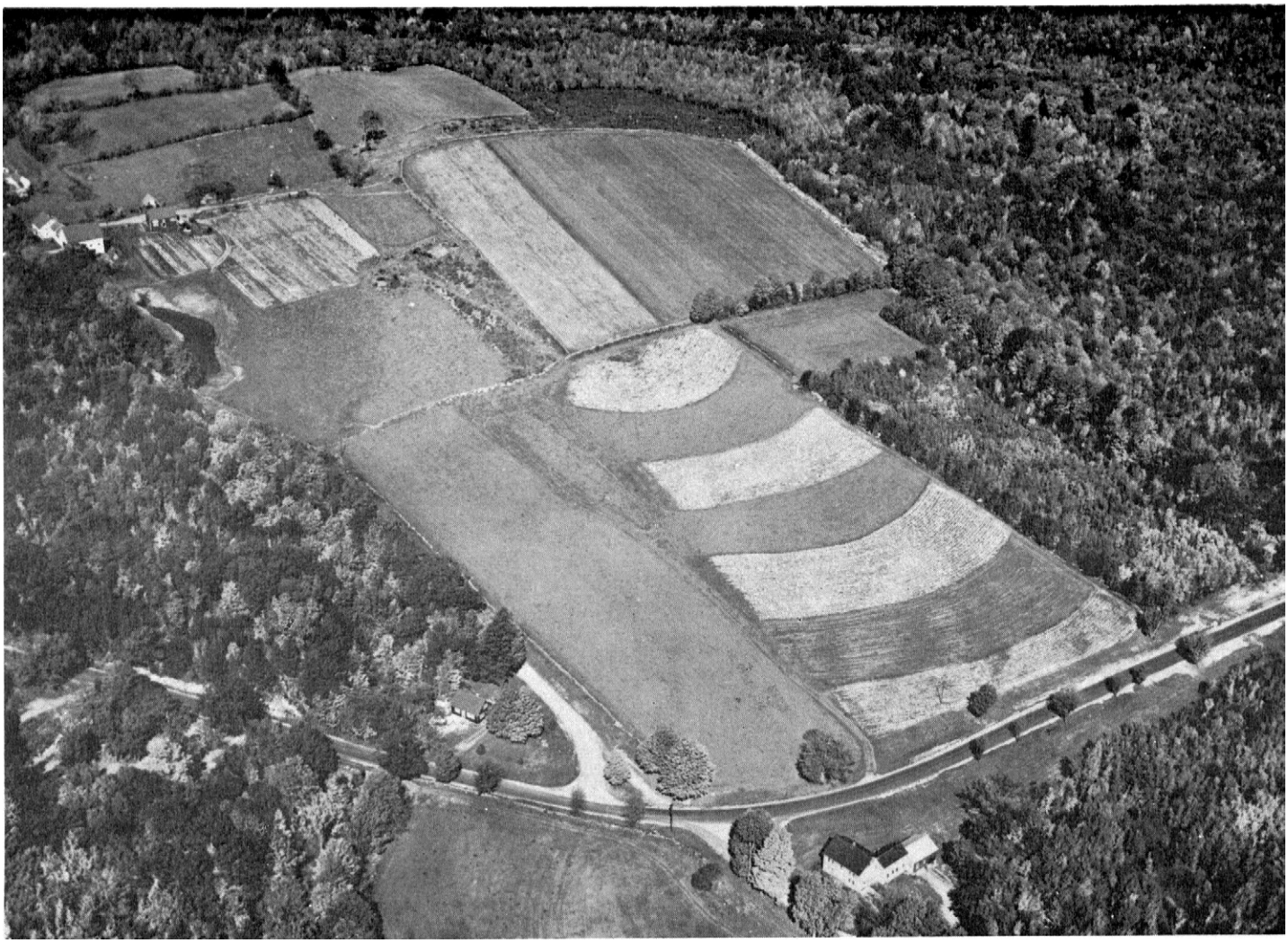


Figure 5.—Stripcropping on Paxton loam, 8 to 15 per cent slopes, which is in capability unit IIIe–6.

This soil is very strongly acid and is low in natural fertility. It is rapidly permeable but has a good moisture-supplying capacity.

This soil is idle or in brushy forest. Tile and surface drainage and smoothing are measures that increase its use. Unless it is drained, it is better suited to hay and pasture than to cultivated crops. If drained, it is suited to corn and late vegetables. Occasional flooding and the lack of suitable outlets, however, may prevent proper drainage. A suitable rotation includes a row crop 1 year in 3. In applying fertilizer, the effects of excess moisture should be considered. Grazing should be restricted to periods when the soil is not wet.

CAPABILITY UNIT IIIw–23

Au Gres loamy sand, 0 to 8 percent slopes, is the only soil in this unit. This soil is poorly drained and has a high water table.

Permeability is moderate to very rapid, but the high water table limits soil air and restricts plant growth. The reaction is strongly acid to medium acid. The capacity to supply nutrients to plants is low.

This soil warms slowly in spring. Unless artificially drained, it is not suited to cultivated crops and is poorly suited to hay and pasture crops. If drained, it can be used for grasses, legumes, corn, and truck crops. It is suited to a cropping system consisting of a row crop and winter cover for 1 year, followed by hay for 3 or more years. It is not suited to alfalfa and other deep-rooted crops. The effects of wetness should be considered in applying fertilizer.

Tile drainage is a common practice on the more nearly level areas, and graded stripcropping with tile drainage is used on the gently sloping areas to lower the water table and reduce the hazard of erosion.

CAPABILITY UNIT IIIw–63

This unit consists of poorly drained, level to gently sloping soils of the Ridgebury series. These soils commonly occupy nearly level areas and depressions in uplands. They are saturated from late in fall until late in spring. They have a pan layer at a depth of about 18 inches.

Permeability is moderate in the surface layer but slow in the pan. The reaction is medium acid.

Unless drained, these soils are suited only to hay and pasture. They warm slowly in spring. Even if artificially drained, they are seldom used for row crops. Tile and surface drainage and, on gently sloping areas, diversions are used to remove excess water. Most surface stones have been removed, but subsurface stones interfere with tillage in places. The effects of wetness must be considered in fertilizing these soils.

CAPABILITY UNIT IIIs–16

Suncook loamy sand is the only soil in this unit. It is a deep, excessively drained, nearly level soil on flood plains. Because of slight differences in elevation, the frequency and duration of flooding are variable.

This soil is very strongly acid to medium acid. It is very rapidly permeable and holds a limited amount of water and nutrients available to plants.

Because of droughtiness, this soil is not well suited to cultivated crops or to hay and pasture. It is usually kept in sod. Irrigation and heavy applications of lime and fertilizer are needed for all crops. This soil occurs in association with soils better suited to farming, and it may be difficult to delineate for special management.

CAPABILITY UNIT IIIs–26

This unit consists of deep, excessively drained soils of the Hinckley and Windsor series. These soils are on sand plains and terraces and are sandy and gravelly. They are nearly level to gently sloping.

The reaction is extremely acid to medium acid. Permeability is very rapid, and only limited amounts of water and nutrients are held available for plants.

If irrigated, these soils can be used for cultivated crops and for hay and pasture. A suitable cropping system consists of 2 years of row crops and winter cover, followed by 3 or more years of hay. Large amounts of lime and fertilizer are needed.

Most farmers maintain the supply of organic matter by plowing under large amounts of cow manure. Stripcropping the gently sloping areas helps to conserve moisture.

These soils warm early in spring and are generally easy to till. In places gravel and cobblestones interfere with tillage.

CAPABILITY UNIT IVe–5

Charlton loam, 15 to 25 percent slopes, is the only soil in this unit. It is a deep, well-drained, very friable soil on uplands. Erosion and subsurface stones are the major limitations.

Permeability is moderate, and adequate supplies of moisture and nutrients are held available for plants. The reaction is strongly acid.

This soil is suited to alfalfa and other pasture and hay crops and to apples. The response to management is good. Because of the risk of erosion, row crops should be grown only for 1 year when the soil is to be reseeded to hay or pasture. Stripcropping is advisable when row crops are grown.

Most surface stones have been removed, but subsurface stones interfere with tillage. The steeper slopes are difficult to work safely with tractor-drawn equipment.

CAPABILITY UNIT IVe–6

Paxton loam, 15 to 25 percent slopes, is the only soil in this unit. This well-drained soil is on uplands. It has a pan layer at a depth of 16 to 20 inches.

Permeability is moderate in the friable subsoil but slow in the pan. Water flows over the pan layer and comes to the surface in seepage spots downslope. The moisture-supplying capacity is good, and nutrients are held readily available to plants. The reaction is strongly acid to medium acid.

This soil is suited to hay and pasture. Because of the erosion hazard and steep slopes, it is not suited to row crops. If kept in sod, it is a good soil for apple orchards, but spot drainage is necessary. The steeper slopes are difficult to work safely with farm equipment. Although most surface stones have been removed, subsurface stones interfere with tillage.

CAPABILITY UNIT IVe–55

Gloucester sandy loam, 15 to 25 percent slopes, is the only soil in this capability unit. It is a somewhat excessively drained soil.

Permeability is rapid, and the available water capacity and natural fertility are low. The reaction is extremely acid to medium acid.

This soil is suited to hay and pasture. Because of the erosion hazard and steep slopes, it is not suited to cultivated crops. The steeper slopes are difficult to work safely with a tractor.

CAPABILITY UNIT IVs–26

This unit consists of deep, excessively drained, sloping soils of the Hinckley and Windsor series. These soils are on plains and terraces.

Permeability is very rapid, and insufficient supplies of moisture and of nutrients are held available to plants. The reaction is extremely acid to medium acid.

If well managed, these soils can be used for hay, pasture, or woodland. They are suited to a cropping system consisting of a row crop and winter cover for 1 year, followed by hay for 3 or more years. Nutrients leach from these soils rapidly, and frequent applications of lime and fertilizer are necessary. The Windsor soils are subject to gullying and soil blowing, both of which can be controlled by stripcropping.

CAPABILITY UNIT Vw–24

Scarboro fine sandy loam, the only soil in this unit, is nearly level and very poorly drained. A high water table keeps this soil waterlogged most of the time, and some areas are ponded for several months.

Permeability is rapid. Reaction ranges from very strongly acid to slightly acid.

This soil is suited to permanent pasture of water-tolerant plants and to trees. Wetness prevents more intensive use, and drainage outlets generally are not available.

CAPABILITY UNIT VIs–7

This unit consists of very stony, somewhat excessively drained and well-drained soils of the Charlton, Gloucester, and Paxton series. These gently sloping to moderately steep soils are covered with so many stones and boulders that the use of farm machinery is nearly impossible. Some of the soils have a pan layer at a depth of about 22 inches.

Figure 6.—**Field of Paxton very stony loam cleared of stones and seeded to grass, in capability unit VIs–7.**

These soils are used mostly for the production of timber. A small acreage is used for commercial production of blueberries. Years ago, many areas were used for permanent pasture. Some of the more nearly level areas would make good cropland if stones were removed (fig. 6). In addition to their use for timber, these soils can be used as wildlife habitats and recreation areas.

CAPABILITY UNIT VIs–57

This unit consists of two complex mapping units made up of the Shapleigh soils, which are shallow to bedrock, and the Gloucester soils, which are deep. These very rocky soils are gently sloping to moderately steep and are somewhat excessively drained. They are studded with outcrops of bedrock.

Water moves downslope over the underlying bedrock and comes to the surface in seepage spots. Plants die for lack of moisture during dry periods. Rock outcrops are so numerous that cultivation is not practical. Most areas are forested. The forests yield timber, protect watersheds, and serve wildlife needs.

CAPABILITY UNIT VIs–72

This unit consists of nearly level and sloping, very stony, moderately well drained soils of the Acton and Woodbridge series. A seasonal high water table occurs at a depth of 12 to 30 inches. The Woodbridge soils have a pan layer at a depth of 20 inches that limits the downward movement of water. They have a good moisture-supplying capacity; the Acton soils have a poor moisture-supplying capacity.

These soils are especially good for timber production. Costly stone removal and drainage are necessary for the production of crops, but, in past years, many areas were used for permanent pasture. The seepage areas are good potential pond sites.

CAPABILITY UNIT VIIw–14

Mixed alluvial land, wet, is the only mapping unit in this capability unit. This nearly level land is frequently flooded and is kept wet by a high water table most of the year. It consists of water-sorted material so variable in

texture and drainage that no specific soil feature can be described.

This land is too wet for cultivated crops or for hay and pasture. It is generally used as wildlife habitat. Only a small acreage is drained.

CAPABILITY UNIT VIIs-7

This unit consists of steep to very steep, very stony soils of the Charlton, Gloucester, and Paxton series. These soils are on uplands.

The somewhat excessively drained Gloucester soil has a limited moisture-supplying capacity, but the well-drained Charlton and Paxton soils have a good moisture-supplying capacity.

These soils are used mainly as woodland, although equipment limitations are severe on the steeper slopes. Some slopes that have a northern exposure are potential ski runs. The use of farm machinery is impractical because of the steep slopes and the many stones and boulders.

CAPABILITY UNIT VIIs-26

Windsor loamy sand, 15 to 60 percent slopes, is the only soil in this unit. This soil contains little or no gravel. Some areas are gullied.

Water moves very rapidly through this soil, and there is little moisture available for plants. Fertility is low, and the reaction is very strongly acid to medium acid.

This soil is too steep for the safe use of farm equipment. Most of it is covered with timber of poor quality that is difficult to harvest. A cover of vegetation is essential for control of erosion.

CAPABILITY UNIT VIIs-27

Hinckley gravelly loamy sand, 15 to 60 percent slopes, is the only soil in this unit. This deep, droughty, very strongly acid soil is very rapidly permeable. It is used mainly as a source of sand and gravel. Much of it is covered with timber of poor quality and with low-growing shrubs that provide the necessary cover to control erosion.

CAPABILITY UNIT VIIs-57

Shapleigh-Gloucester very rocky sandy loams, 25 to 60 percent slopes, are the only soils in this unit. These soils occur as a complex in which the shallow Shapleigh soil is intermingled with the deeper Gloucester soil.

These somewhat droughty soils are studded with outcrops of bedrock and are too steep for cultivated crops or for hay or pasture. They are mostly wooded, but the steep slopes make woodland management difficult. Some slopes are good potential ski runs.

CAPABILITY UNIT VIIs-58

This unit consists of extremely stony, deep soils and extremely rocky, shallow soils of the Charlton, Gloucester, and Shapleigh series. The extremely rocky Shapleigh and Gloucester soils occur as complexes. The slope range is 8 to 60 percent. Drainage is good to somewhat excessive. Stones are so numerous that in some places one can step from stone to stone.

The Gloucester and Shapleigh soils are somewhat excessively drained and are droughty, but the Charlton soils are well drained and readily supply moisture to plants. These soils can be used as woodland, but the boulders and rock outcrops hinder logging operations. In many places, logging is possible only when the snow is deep. The well-drained soils are suited to many kinds of trees; the droughty soils to few kinds.

CAPABILITY UNIT VIIs-73

This unit consists of level to gently sloping, very stony, poorly drained soils of the Ridgebury series. These soils have a pan layer at a depth of about 18 inches. A fluctuating water table and stoniness are the main limitations.

Water moves slowly through the pan layer. In dry seasons the water table drops to a depth of 5 feet or more in places, but usually it is near the surface.

These soils are used mainly as woodland. The high water table does not seriously restrict the growth of white pine and red spruce. If cleared of stones and artificially drained, these soils can be used for some forage crops.

CAPABILITY UNIT VIIs-74

This unit consists of very stony, level to gently sloping soils of the Ridgebury and Whitman series. The Ridgebury soils are poorly drained, and the Whitman soils are very poorly drained. These soils may occur together or separately. They are saturated by a high water table from late in fall through spring.

These soils are too wet and stony for cultivated crops or for hay or pasture. They are good sites for ponds.

CAPABILITY UNIT VIIIw-89

Marsh is the only mapping unit in this capability unit. This land is covered with shallow water most of the year. Because drainage of it is impractical, it is suitable mostly for wetland wildlife habitat. The habitat can be improved in some places by controlling the water level.

CAPABILITY UNIT VIIIs-90

Rock outcrop, the only mapping unit in this capability unit, is mostly bare rock. It is generally on mountaintops, hilltops, and steep cliffs. It has no use as farmland or woodland, but some areas have scenic value.

Estimated yields

Table 2 gives estimated average yields per acre of the principal crops grown in the county, under two levels of management. Those in columns A are to be expected under the common level of management now prevailing; those in columns B can be expected under improved management. The estimates are the averages that can be expected over a period of several years. In any one year, yields may be affected by several factors, such as favorable or unfavorable weather, plant diseases, or insects.

For most soils, records of yields were not available. Consequently, the estimates are based on the judgment of people who know the soils and agriculture of the county.

Under prevailing management (1) insufficient amounts of lime, fertilizer, and manure are applied; (2) erosion control, drainage, and irrigation are inadequate; (3) certified seed and improved varieties of crops are not always used; (4) seedbeds are not always prepared properly; (5) insects and diseases are not adequately controlled; and (6) some of the pastures are brushy, weedy, and unimproved.

TABLE 2.—*Estimated average acre yields of the principal crops under two levels of management*

[Yields in columns A are those obtained under common management; those in columns B can be expected under improved management. Absence of figure indicates the crop is not commonly grown or is not well suited to the soil, or yields do not justify the level of management specified. Very steep, stony, or rocky soils, extremely wet soils, and miscellaneous land types have been omitted from the table]

Soil	Corn for grain		Corn for silage [1]		Grass-clover hay mixtures		Alfalfa-grass hay mixtures		Oats		Potatoes		Tall grass-legume pasture	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Cow-acre-days* [2]	*Cow-acre-days* [2]
Acton and Acton firm substratum, fine sandy loams, 0 to 8 percent slopes	35	75	7	15	2.0	4.0	2.0	4.0	35	45	----	----	110	220
Au Gres loamy sand, 0 to 8 percent slopes	--	--	----	12	1.0	3.0	----	----	--	--	----	----	55	110
Charlton loam, 3 to 8 percent slopes	55	90	12	18	2.0	4.0	2.5	4.5	40	55	350	550	125	250
Charlton loam, 8 to 15 percent slopes	55	90	12	18	2.0	4.0	2.5	4.5	40	55	350	550	125	250
Charlton loam, 15 to 25 percent slopes	--	90	----	18	1.0	3.0	1.5	3.5	--	--	----	----	125	250
Deerfield loamy sand, 0 to 3 percent slopes	35	75	10	15	2.0	4.0	2.5	4.0	35	45	----	----	110	220
Deerfield loamy sand, 3 to 8 percent slopes	35	75	10	15	2.0	4.0	2.5	4.0	35	45	----	----	110	220
Gloucester sandy loam, 3 to 8 percent slopes	50	75	10	15	1.5	2.5	2.5	4.0	40	50	325	450	110	165
Gloucester sandy loam, 8 to 15 percent slopes	50	75	10	15	1.5	2.5	2.5	4.0	40	50	325	450	110	165
Gloucester sandy loam, 15 to 25 percent slopes	--	75	----	15	.5	1.5	1.5	3.0	--	--	----	----	110	165
Hinckley loamy sand, 0 to 3 percent slopes	--	--	----	9	.5	1.0	1.0	2.0	20	30	----	----	----	85
Hinckley loamy sand, 3 to 8 percent slopes	--	--	----	9	.5	1.0	1.0	2.0	20	30	----	----	----	85
Hinckley loamy sand, 8 to 15 percent slopes	--	--	----	9	.5	1.0	1.0	2.0	20	30	----	----	----	85
Ondawa fine sandy loam, high bottom	90	125	18	25	2.0	4.0	2.5	4.0	40	70	350	600	125	250
Paxton loam, 0 to 8 percent slopes	60	100	12	20	2.5	4.5	2.5	4.5	40	55	350	600	130	255
Paxton loam, 8 to 15 percent slopes	60	100	12	20	2.5	4.5	2.5	4.5	40	55	350	600	130	255
Paxton loam, 15 to 25 percent slopes	--	100	----	20	1.5	3.5	1.5	3.5	--	--	----	----	130	255
Podunk fine sandy loam	50	75	10	15	2.5	4.0	2.0	4.0	40	50	----	----	110	220
Ridgebury loam, 0 to 3 percent slopes	--	60	----	12	1.0	3.0	----	----	--	--	----	----	55	110
Ridgebury loam, 3 to 8 percent slopes	--	60	----	12	1.0	3.0	----	----	--	--	----	----	55	110
Rumney fine sandy loam	--	60	----	12	1.0	3.0	----	----	--	--	----	----	55	110
Scarboro fine sandy loam	--	--	----	----	1.0	2.0	----	----	--	--	----	----	50	100
Shapleigh-Gloucester sandy loams, 3 to 8 percent slopes	30	50	6	10	1.5	2.5	1.5	2.5	25	35	----	----	55	110
Shapleigh-Gloucester sandy loams, 8 to 15 percent slopes	30	50	6	10	1.5	2.5	1.5	2.5	25	35	----	----	55	110
Suncook loamy sand	--	--	4	10	1.0	2.0	1.0	2.0	20	30	----	----	50	100
Windsor loamy sand, 0 to 3 percent slopes	--	--	4	10	1.0	2.0	1.0	2.0	20	30	----	----	50	100
Windsor loamy sand, 3 to 8 percent slopes	--	--	4	10	1.0	2.0	1.0	2.0	20	30	----	----	50	100
Windsor loamy sand, 8 to 15 percent slopes	--	--	4	10	1.0	2.0	1.0	2.0	20	30	----	----	50	100
Woodbridge loam, 0 to 8 percent slopes	50	75	10	15	2.5	4.0	2.0	4.0	40	50	----	----	110	220
Woodbridge loam, 8 to 15 percent slopes	50	75	10	15	2.5	4.0	2.0	4.0	40	50	----	----	110	220

[1] Estimates are for green weight.

[2] Cow-acre-days is a term used to express the carrying capacity of pasture. It is the number of animal units carried per acre, multiplied by the number of days the pasture can be grazed without damage during one season. An animal unit is one cow, steer, or horse; five hogs; or seven sheep or goats. An acre of pasture that provides 30 days of grazing for two cows has a carrying capacity of 60 cow-acre-days.

Under improved management (1) lime, manure, and commercial fertilizer are applied according to needs determined by soil tests and crop requirements; (2) crop residue is returned to the soil; (3) suitable cropping systems are used; (4) irrigation and drainage systems are constructed if necessary; (5) runoff and erosion are controlled; (6) weeds, brush, insects, and diseases are controlled; (7) certified seed varieties are selected; and (8) pastures are improved and maintained by applying fertilizer and lime, controlling brush and weeds, seeding desirable forage mixtures, and regulating grazing.

Soils in Woodland Management

This section relates briefly the history of woodland in Belknap County, gives estimated yields of specified trees according to site class, and rates the soils according to their suitability for trees.

Woodland history [2]

About 81 percent of the land area, or 210,000 acres, of Belknap County is woodland. Most of the trees are hardwoods and white pine of poor quality. Very little of the white pine is in the saw-log class, and hardwoods in the saw-log and veneer class are almost nonexistent. Of the present woodland, 61 percent is white pine, 7 percent is spruce and fir, and 32 percent is transitional and northern hardwoods. Between 1956 and 1962 the average annual timber cut was 9,065,743 board feet of softwood and 1,641,263 board feet of hardwood.

A brief history of forestry in the county reveals man's influence on the evolution of forest types. When the first large permanent settlements in Belknap County were established about 1760, the land area was about 95 percent

[2] By ROGER LEIGHTON, formerly county forester, Belknap County Cooperative Extension Service.

forested. According to an early description, white pine, white oak, and chestnut were predominant on sandy soils, and birch, hemlock, and sugar maple were common on the loamy till soils.

Farming in the county has had a marked influence on the forests. Between 1835 and 1860, at least 60 percent of the land was cleared of trees and used for crops or pasture. After 1850, some of the cropland and open pasture was abandoned. These areas reverted to softwoods. Consequently, extensive stands of white pine became saw-log size about 1900.

Before 1900, most of the woodland was a part of small farm units. The farm woodlot furnished a cash crop of saw logs and cordwood, fuel for home use and for making maple sugar, hemlock bark for tanning leather, and potash for making soap.

At the turn of the century, many small farms were abandoned, and open farmland was rapidly reforested. The development of light, portable sawmills made the use of small timber economical, and clear cutting became standard practice. The clear-cut areas grew back to low-value fuel or pulp trees such as red maple. When oil was substituted for wood as fuel, the demand for low-value trees further decreased. As a result the woodland has increased in extent and decreased in quality.

Woodland interpretations

In this section the soils of the county are rated according to their productivity and limitations for use as woodland.

Soils, climate, and topography have a combined effect on the growth of trees. Soils differ in capacity to supply plant nutrients and water and in such characteristics as depth, texture, and drainage. Climate determines the amount of rain, snow, ice, and sunshine that trees receive and the temperature changes that occur. Topography, through its effect on drainage and exposure, also influences the growth of trees. The combined effect of these factors is expressed as site index.

Field studies were made in this county and elsewhere to determine the site index of representative soils for white pine, red spruce, red oak, and northern hardwoods. No measurements were taken on some soils, but the site index was assumed to be approximately the same as that for soils having similar characteristics.

In table 3 the soils are rated as excellent, good, fair, or poor for the growth of white pine, red spruce, red oak, and northern hardwoods, and as good, fair, poor, or unsuitable for planting with white pine, red pine, white spruce, and balsam fir. The relative degrees of windthrow hazard, seedling mortality, plant competition, limitations on use of equipment, and limitations on construction of roads are rated as slight, moderate, or severe.

Estimated productivity ratings in table 3 are based on site indexes. The site index for a given species of trees on a given soil is the average height of the dominant and codominant trees at the age of 50 years. In table 3 a soil that has a site index of 70 feet or more for white pine has a rating of *excellent.*

With the ratings in table 3, the yield data listed above can be used to estimate for each mapping unit the average growth per acre of natural, unmanaged stands of white pine, northern hardwoods, red spruce, and red oak at age 50. The yields of northern hardwoods are from trees 12 inches in diameter at breast height and up to an 8-inch top.

Forest species and productivity ratings	*Site index range*	*Average yield per acre*
	Feet	*Board feet*
White pine:		
Excellent	70 and more	50, 000
Good	60 to 69	36, 000
Fair	50 to 59	24, 000
Poor	49 or less	14, 000
Northern hardwoods:		
Excellent	59 and more	3, 000
Good	53 to 58	2, 300
Fair	45 to 52	900
Poor	44 or less	---
Red spruce:		
Excellent	50 and more	10, 000
Good	40 to 49	6, 000
Fair	30 to 39	3, 000
Poor	29 or less	---
Red oak:		
Excellent	65 and more	9, 750
Good	55 to 64	6, 300
Fair	45 to 54	3, 250
Poor	44 or less	1, 400

The yield data listed above are from the following sources: White pine—USDA Bulletin 13 (*6*) [3]; northern hardwoods—Proceedings of the First North American Forest Soils Conference, 1958 (*4*); red spruce—volume yields from USDA Technical Bulletin 142 (*9*) and site index data from an unpublished site index curve prepared by the Soil Conservation Service and the Vermont Forest Service in 1962; red oak—volume yields from USDA Technical Bulletin 560 (*11*) and site index data from Lake States Forest Experimental Station Technical Note 485 (*21*).

Equipment limitations are rated according to the degree to which soil characteristics restrict the kind of equipment and the time of year during which it can be used. Natural wetness, steepness of slope, and stones and boulders are the principal limiting factors. Limitations are *slight* if slopes are less than 15 percent and there are no special problems in the use of equipment throughout the year; *moderate* if the use of heavy equipment is restricted by wetness as much as 3 months of the year, or if slopes range from 15 to 25 percent; *severe* if the restriction is for more than 3 months, if slopes are greater than 25 percent, or if the soil is extremely stony or rocky.

Windthrow hazard depends on the development of roots and on the ability of the soil to hold trees firmly. A high water table, a pan layer, or bedrock can limit the depth of roots. The hazard is *slight* if roots of trees develop normally and windthrow is not common; *moderate* if trees remain standing unless wind velocity is high and soils are unusually wet; *severe* if the soil does not allow adequate rooting.

Woodland roads limitations are determined by natural drainage, rockiness, erosion hazard, and other factors that affect the construction and use of access roads. The rating is *slight* if there are no special problems; *moderate* if the construction or use of roads is limited for less than 3 months a year; *severe* if wetness limits construction or normal use for more than 3 months, or if boulders or rock outcrops limit construction.

[3] Italic numbers in parentheses refer to Literature Cited, p. 66.

TABLE 3.—*Estimated productivity, limitations,*

Soil series and map symbols	Estimated productivity ratings for—				Factors
	White pine	Red spruce	Red oak	Northern hardwoods	Equipment limitations
Acton: (AaB, AtB, AtC)	Excellent	Excellent	Good	Good	Moderate
Au Gres: (AuB)	Good	Good	Fair	Good	Severe
Charlton: (CaB, CaC, ChB, ChC)	Good	Good	Good	Fair	Slight
(CaD, ChD)	Good	Good	Good	Fair	Moderate
(ChE)	Good	Good	Good	Fair	Severe
(CrD, CrE)	Good	Good	Good	Fair	Severe
Deerfield: (DeA, DeB)	Excellent	Excellent	Good	Good	Slight
Gloucester: (GcB, GcC, GrB, GrC)	Good	Good	Good	Fair	Slight
(GcD, GrD)	Good	Good	Good	Fair	Moderate
(GrE)	Good	Good	Good	Fair	Severe
(GsD, GsE)	Good	Good	Good	Fair	Severe
Gravel and Borrow pits: (Gv) (Too variable to rate)					
Hinckley: (HsA, HsB, HsC)	Fair	Fair	Fair	Fair	Slight
(HrE)	Fair	Fair	Fair	Fair	Severe
Made land: (Ma) (Too variable to rate)					
Marsh: (Mh)	Unproductive	Unproductive	Unproductive	Unproductive	Severe
Mixed alluvial land, wet: (Ml)	Variable	Variable	Variable	Variable	Severe
Muck and Peat: (Mp)	Poor	Fair	Poor	Poor	Severe
Ondawa: (Oh)	Good	Fair	Good	Fair	Slight
Paxton: (PaB, PaC, PnB, PnC)	Good	Good	Good	Good	Slight
(PaD, PnD)	Good	Good	Good	Good	Moderate
(PnE)	Good	Good	Good	Good	Severe
Podunk: (Po)	Excellent	Excellent	Good	Good	Slight
Ridgebury: (RbA, RbB, RdA, RdB)	Good	Good	Fair	Fair	Severe
(RhA, RhB) (For Whitman part of RhA and RhB, see Whitman series).	Fair	Fair	Poor	Poor	Severe
Rock outcrop: (Ro)	Unproductive	Unproductive	Unproductive	Unproductive	Severe
Rumney: (Ru)	Good	Good	Fair	Fair	Severe
Scarboro: (Sc)	Fair	Fair	Poor	Fair	Severe
Shapleigh: (SgB, SgC, ShC)	Fair	Good	Fair	Fair	Slight
(ShD)	Fair	Good	Fair	Fair	Moderate
(ShE)	Fair	Good	Fair	Fair	Severe
(SoD, SoE) (For Gloucester part of these mapping units, see Gloucester series).	Fair	Good	Fair	Fair	Severe

and suitability of the soils for trees

affecting management				Suitability for planting—			
Windthrow hazard	Limitations on woodland roads	Seedling mortality	Plant competition	White pine	Red pine	White spruce	Balsam fir
Moderate	Moderate	Slight	Severe	Good	Fair	Good	Good.
Moderate	Severe	Moderate	Moderate	Fair	Not suitable	Fair	Fair.
Slight	Slight	Slight	Severe	Good	Good	Good	Good.
Slight	Slight	Slight	Severe	Good	Good	Good	Good.
Slight	Moderate	Slight	Severe	Good	Good	Good	Good.
Slight	Severe	Slight	Severe	Good	Good	Good	Good.
Slight	Moderate	Slight	Severe	Good	Fair	Good	Good.
Slight	Slight	Moderate	Moderate	Good	Good	Fair	Poor.
Slight	Slight	Moderate	Moderate	Good	Good	Fair	Poor.
Slight	Moderate	Moderate	Moderate	Good	Good	Fair	Poor.
Slight	Severe	Moderate	Moderate	Good	Good	Fair	Poor.
Slight	Slight	Severe	Slight	Good	Good	Poor	Poor.
Slight	Slight	Severe	Slight	Good	Good	Poor	Poor.
Severe	Severe	Severe	Severe	Not suitable	Not suitable	Not suitable	Not suitable.
Severe	Severe	Severe	Severe	Poor	Not suitable	Fair	Fair.
Severe	Severe	Severe	Severe	Not suitable	Not suitable	Not suitable	Not suitable.
Slight	Slight	Slight	Severe	Good	Good	Good	Fair.
Moderate	Slight	Slight	Severe	Good	Good	Good	Good.
Moderate	Slight	Slight	Severe	Good	Good	Good	Good.
Moderate	Moderate	Slight	Severe	Good	Good	Good	Good.
Slight	Moderate	Slight	Severe	Good	Fair	Good	Good.
Severe	Severe	Moderate	Severe	Fair	Not suitable	Fair	Fair.
Severe	Severe	Severe	Severe	Poor	Not suitable	Fair	Fair.
Severe	Severe	Severe	Slight	Not suitable	Not suitable	Not suitable	Not suitable.
Severe	Severe	Severe	Severe	Fair	Not suitable	Fair	Fair.
Severe	Severe	Severe	Severe	Poor	Not suitable	Fair	Fair.
Moderate	Slight	Moderate	Moderate	Fair	Fair	Fair	Fair.
Moderate	Moderate	Moderate	Moderate	Fair	Fair	Fair	Fair.
Moderate	Severe	Moderate	Moderate	Fair	Fair	Fair	Fair.
Severe	Severe	Severe	Slight	Poor	Poor	Poor	Poor.

TABLE 3.—*Estimated productivity, limitations,*

Soil series and map symbols	Estimated productivity ratings for—				Factors
	White pine	Red spruce	Red oak	Northern hardwoods	Equipment limitations
Suncook: (Sy)	Fair	Fair	Fair	Fair	Slight
Whitman: (Wa)	Fair	Fair	Poor	Poor	Severe
Windsor: (WdA, WdB, WdC)	Fair	Fair	Fair	Fair	Slight
(WdE)	Fair	Fair	Fair	Fair	Severe
Woodbridge: (WoB, WoC, WvB, WvC)	Excellent	Excellent	Excellent	Excellent	Moderate

Seedling mortality refers to loss of seedlings after adequate natural seeding or suitable planting. Mortality is *slight* if trees ordinarily regenerate naturally in places where there are sufficient seeds, or if the loss is not more than 25 percent of the planted stock; *moderate* if trees do not regenerate naturally in numbers adequate for restocking, or if the loss is between 25 and 50 percent of planted stock; *severe* if the loss is more than 50 percent of the planted stock.

Plant competition refers to the degree of competition from other plants and the rate at which undesirable species invade the woodland when openings are made in the canopy. Competition is *slight* if unwanted plants are no special problem; *moderate* if the invaders delay but do not prevent the establishment of a fully stocked, normal stand; *severe* if invaders prevent natural or artificial regeneration unless intensive control is maintained.

Suitability for tree planting is rated according to the ability of the soil to produce certain species of trees. Such factors as cover, past use, elevation, and aspect were not considered in making these ratings. The ratings are based on experience and judgment of foresters and soil scientists familiar with woodland problems in the county.

Soils in Wildlife Management [4]

Belknap County is well known for hunting and fishing. Lake Winnipesaukee, Squam Lake, and Winnisquam Lake provide excellent fishing for lake trout, landlocked salmon, and smelt, and they are good waters for ice fishing. The smaller lakes and ponds furnish both trout fishing and warm-water fishing. Duck hunting is good in the marshes (fig. 7) and along the Merrymeeting River. Other hunting is primarily for deer and for snowshoe hare, grouse, and other small game.

Soil-wildlife relationships are presented in this section first according to the suitability of individual soils, regardless of the present use of the soils (*1*), and then according to the present food, cover, and kinds of wildlife (*12*). These present soil-wildlife relationships are described as they occur on soil associations, which are shown on the General Soil Map in this survey.

[4] This subsection was prepared by DAVID N. ALLAN, field biologist, Soil Conservation Service.

Suitability of the soils for wildlife habitat

In table 4 the soils are rated according to their suitability for three major kinds of wildlife and for selected habitat elements. These ratings can aid landowners in the selection of sites to be managed as wildlife habitat. They indicate the intensity of management needed, and they provide a basis for grouping soils so that management of broad areas can be planned.

The kinds of wildlife are defined as follows:

Openland wildlife.—Pheasants, meadowlarks, red foxes, and woodchucks are examples of openland wildlife. They normally frequent cropland, pasture, meadow, lawns, and other open areas vegetated by grasses, herbs, and shrubs.

Woodland wildlife.—Ruffed grouse, woodcocks, thrushes, vireos, gray squirrels, white-tailed deer, snowshoe hares, and raccoons are examples of woodland wildlife.

Wetland wildlife.—Ducks, herons, shore birds, minks, muskrats, beavers, and other birds and mammals that live in ponds, marshes, and swamps are wetland wildlife.

The habitat elements are defined as follows:

Grain and seed crops.—Domestic grains or seed-producing annual herbaceous plants, such as corn, wheat, millet, buckwheat, oats, soybeans, and sunflowers, that have been planted.

Grasses and legumes.—Domestic perennial grasses and herbaceous legumes, such as fescue, brome, bluegrass, timothy, redtop, orchardgrass, reed canarygrass, clover, trefoil, and alfalfa, that have been planted.

Wild herbaceous upland plants.—Native or introduced perennial grasses and weeds, such as bluestem, indiangrass, wheatgrass, strawberries, beggarweed, wild beans, nightshade, goldenrod, and dandelions, that generally grow wild.

Hardwood woodland plants.—Hardwood trees, shrubs, and vines that produce fruits, nuts, buds, catkins, twigs, and foliage used as food by wildlife, and that commonly grow wild but may be planted. Examples are oak, beech, cherry, hawthorn, dogwood, viburnum, maple, birch, poplar, grape, blueberry, brier, and rose.

Coniferous woodland plants.—Cone-bearing trees and shrubs that are important mainly as cover but also furnish food in the form of browse, seeds, or cones. They commonly grow wild but may be planted. Examples are pine, spruce, hemlock, balsam, juniper, and yew. Slow growth

and suitability of the soils for trees

affecting management				Suitability for planting—			
Windthrow hazard	Limitations on woodland roads	Seedling mortality	Plant competition	White pine	Red pine	White spruce	Balsam fir
Slight	Slight	Severe	Slight	Good	Good	Poor	Poor.
Severe	Severe	Severe	Severe	Poor	Not suitable	Fair	Fair.
Slight	Slight	Severe	Slight	Good	Good	Poor	Poor.
Slight	Slight	Severe	Slight	Good	Good	Poor	Poor.
Moderate	Moderate	Slight	Severe	Good	Fair	Good	Good.

***Figure 7.*—Marsh area developed as habitat for wetland wildlife.**

TABLE 4.—*Suitability of*

Soil series and map symbols	Kinds of wildlife			Habitat elements
	Openland	Woodland	Wetland	Grain and seed crops
Acton:				
(AaB)	Good	Good	Unsuitable	Fair
(AtB, AtC)	Poor	Good	Unsuitable	Unsuitable
Au Gres:				
(AuB)	Fair	Good	Fair	Poor
Charlton:				
(CaB, CaC)	Good	Good	Unsuitable	Fair
(CaD)	Fair	Fair	Unsuitable	Poor
(ChB, ChC, ChD, ChE)	Poor	Fair	Unsuitable	Unsuitable
(CrD, CrE)	Poor	Fair	Unsuitable	Unsuitable
Deerfield:				
(DeA)	Good	Good	Poor	Fair
(DeB)	Good	Good	Unsuitable	Fair
Gloucester:				
(GcB, GcC)	Good	Fair	Unsuitable	Fair
(GcD)	Fair	Fair	Unsuitable	Poor
(GrB, GrC, GrD, GrE)	Poor	Fair	Unsuitable	Unsuitable
(GsD, GsE)	Poor	Fair	Unsuitable	Unsuitable
Gravel and Borrow pits:				
(Gv) (Not rated; does not provide suitable habitats).				
Hinckley:				
(HsA, HsB, HsC)	Poor	Poor	Unsuitable	Poor
(HrE)	Unsuitable	Poor	Unsuitable	Unsuitable
Made land:				
(Ma) (Not rated; soil properties are variable).				
Marsh:				
(Mh)	Unsuitable	Unsuitable	Good	Unsuitable
Mixed alluvial land, wet:				
(Ml) (Not rated; soil properties are variable).				
Muck and Peat:				
(Mp)	Unsuitable	Unsuitable	Good	Unsuitable
Ondawa:				
(Oh)	Good	Good	Unsuitable	Good
Paxton:				
(PaB, PaC)	Good	Good	Unsuitable	Fair
(PaD)	Fair	Fair	Unsuitable	Poor
(PnB, PnC, PnD, PnE)	Poor	Fair	Unsuitable	Unsuitable
Podunk:				
(Po)	Good	Good	Poor	Fair
Ridgebury:				
(RbA)	Fair	Good	Good	Poor
(RbB)	Fair	Good	Unsuitable	Poor
(RdA)	Poor	Fair	Good	Unsuitable
(RdB)	Poor	Fair	Unsuitable	Unsuitable
(RhA)	Poor	Good	Good	Unsuitable
(RhB)	Poor	Good	Unsuitable	Unsuitable
(For Whitman part of RhA and RhB, see Whitman series).				
Rock outcrop:				
(Ro) (Not rated; does not provide suitable habitats).				
Rumney:				
(Ru)	Poor	Good	Fair	Unsuitable
Scarboro:				
(Sc)	Poor	Good	Good	Unsuitable
Shapleigh:				
(SgB, SgC)	Fair	Fair	Unsuitable	Fair
(ShC, ShD, ShE)	Poor	Fair	Unsuitable	Unsuitable
(SoD, SoE)	Unsuitable	Poor	Unsuitable	Unsuitable
(For Gloucester part of these mapping units, see Gloucester series).				

the soils for wildlife habitat

Habitat elements—Continued						
Grasses and legumes	Wild herbaceous upland plants	Woodland plants		Wetland plants	Shallow water	Ponds (excavated)
		Hardwoods	Coniferous			
Good	Good	Good	Poor	Unsuitable	Unsuitable	Unsuitable.
Poor	Good	Good	Poor	Unsuitable	Unsuitable	Unsuitable.
Fair	Fair	Good	Fair	Fair	Fair	Fair.
Good	Good	Good	Poor	Unsuitable	Unsuitable	Unsuitable.
Fair	Good	Good	Poor	Unsuitable	Unsuitable	Unsuitable.
Poor	Good	Good	Poor	Unsuitable	Unsuitable	Unsuitable.
Unsuitable	Good	Good	Poor	Unsuitable	Unsuitable	Unsuitable.
Good	Good	Good	Poor	Poor	Poor	Poor.
Good	Good	Good	Poor	Unsuitable	Unsuitable	Unsuitable.
Good	Good	Fair	Fair	Unsuitable	Unsuitable	Unsuitable.
Fair	Good	Fair	Fair	Unsuitable	Unsuitable	Unsuitable.
Poor	Good	Fair	Fair	Unsuitable	Unsuitable	Unsuitable.
Unsuitable	Good	Fair	Fair	Unsuitable	Unsuitable	Unsuitable.
Poor	Poor	Poor	Good	Unsuitable	Unsuitable	Unsuitable.
Unsuitable	Poor	Poor	Good	Unsuitable	Unsuitable	Unsuitable.
Unsuitable	Unsuitable	Unsuitable	Unsuitable	Good	Good	Unsuitable.
Unsuitable	Unsuitable	Unsuitable	Unsuitable	Good	Good	Unsuitable.
Good	Good	Good	Poor	Unsuitable	Unsuitable	Unsuitable.
Good	Good	Good	Poor	Unsuitable	Unsuitable	Unsuitable.
Fair	Good	Good	Poor	Unsuitable	Unsuitable	Unsuitable.
Poor	Good	Good	Poor	Unsuitable	Unsuitable	Unsuitable.
Good	Good	Good	Poor	Poor	Poor	Poor.
Fair	Fair	Good	Fair	Good	Fair	Fair.
Fair	Fair	Good	Fair	Poor	Unsuitable	Unsuitable.
Poor	Fair	Good	Fair	Good	Fair	Fair.
Poor	Fair	Good	Fair	Poor	Unsuitable	Unsuitable.
Poor	Fair	Good	Fair	Good	Good	Good.
Poor	Fair	Good	Fair	Poor	Unsuitable	Unsuitable.
Poor	Poor	Good	Good	Good	Poor	Unsuitable.
Poor	Poor	Good	Good	Good	Good	Good.
Fair	Fair	Fair	Fair	Unsuitable	Unsuitable	Unsuitable.
Poor	Fair	Fair	Fair	Unsuitable	Unsuitable	Unsuitable.
Unsuitable	Poor	Poor	Good	Unsuitable	Unsuitable	Unsuitable.

TABLE 4.—*Suitability of the soils*

Soil series and map symbols	Kinds of wildlife			Habitat elements
	Openland	Woodland	Wetland	Grain and seed crops
Suncook: (Sy)	Poor	Poor	Unsuitable	Poor
Whitman: (Wa)	Poor	Good	Good	Unsuitable
Windsor: (WdA, WdB, WdC)	Poor	Poor	Unsuitable	Poor
(WdE)	Unsuitable	Poor	Unsuitable	Unsuitable
Woodbridge: (WoB, WoC)	Good	Good	Unsuitable	Fair
(WvB, WvC)	Poor	Fair	Unsuitable	Unsuitable

and delay of canopy closure are desirable for this kind of wildlife habitat.

Wetland food and cover plants.—Annual and perennial wild herbaceous plants that grow in moist or wet sites. Examples are smartweed, wild millet, bulrush, spikesedge, rush, reed, sedge, burreed, wildrice, rice cutgrass, switchgrass, mannagrass, bluejoint, and cattail. Submerged or floating aquatic plants are not included.

Shallow water.—Impounded or excavated areas in which water generally is not more than 5 feet deep. The water is impounded or controlled by low dams or levees, dugouts, level ditches, or other devices.

Excavated ponds.—Dugout areas or combinations of dugout and dammed areas that have water of suitable quality and depth for fish and wildlife. An example is a pond that has at least one-tenth acre of surface area, an average depth of at least 6 feet over at least one-fourth of the area, and a dependably high water table or other source of unpolluted water of low acidity.

Soil associations and wildlife

The population and distribution of wildlife in Belknap County are discussed here in relation to the soil associations, which are shown on the General Soil Map. The soil associations have been grouped into three wildlife areas.

WILDLIFE AREA 1

This area encompasses soil association 3, which is in the eastern and the west-central parts of the county. It is made up of steep, mountainous terrain and includes the islands in Lake Winnipesaukee. The extremely stony Gloucester soils and extremely rocky Shapleigh soils are dominant.

Most of this area is forested. Northern hardwoods, mainly beech, sugar maple, and red maple, are predominant. Associated with these are white pine and hemlock. Red oak, black cherry, poplar, white birch, gray birch, white ash, and basswood also occur. Many kinds of shrubs and small trees, important as food and cover for wildlife, are found in abandoned fields and in woodlands, especially those that have been heavily cut over. These include thornapple, wild apple, chokecherry, pin cherry, viburnum, dogwood, raspberry, and blackberry and, on the wetter sites, alder and willow. Striped maple, mountain maple, mountain ash, hornbeam, hophornbeam, and Canada yew are common small trees of the heavily wooded areas. At the highest elevations, spruce predominates and low-bush blueberry and other shrubs grow in the rockier, more open areas.

Deer.—The habitat for deer generally is poor in the more mountainous parts of this area where timber has not been extensively harvested in recent years. It is better in the hilly parts, particularly those that have been recently cut over, and in abandoned fields and pastures that are partly covered with shrubs and saplings. A few small areas of grassland and cropland provide spring and summer feeding. Deep snows in the mountainous wintering grounds are a limitation. The spruce areas on the mountaintops provide poor habitat for deer.

Snowshoe hare.—Newly cutover areas, especially those having an abundance of small conifers, raspberry bushes, gray birch, sumac, and poplar, are the best habitat for snowshoe hare. Snowshoes also use alder and willow swamps to a great extent. They generally are scarce in the older forests such as those in the mountains. Many spruce areas at lower elevations support a good population of snowshoe hare. They are able to reach browse unavailable to deer because they can travel in very deep snow. Their population fluctuates at intervals regardless of the suitability of habitat.

Ruffed grouse.—Clearings, overgrown fields and pastures, swamps, and roadsides are good grouse habitat. Such areas are mostly on the lower hills and slopes and along streams and drainageways. Although conifers are of some importance, extensive stands of pole-size conifers are poor grouse habitat. Grouse eat thornapples, wild apple buds, dogwood berries, bittersweet berries, raspberries, beechnuts, poplar buds, birch buds, catkins, wild cherries, nutlets, and many other foods. Because they forage from the ground to the treetops, food seldom limits their number, but the number fluctuates for unknown reasons from time to time.

Woodcock.—Brushy overgrown pastures, thickets of birch and poplar saplings, and somewhat open alder and willow swamps are good habitat for woodcock. These are generally on the bottom lands and lower slopes. The quality of habitat declines when trees grow beyond the sapling stage and the brushy and swampy areas are no longer pastured.

for wildlife habitat—Continued

Habitat elements—Continued						
Grasses and legumes	Wild herbaceous upland plants	Woodland plants		Wetland plants	Shallow water	Ponds (excavated)
		Hardwoods	Coniferous			
Poor	Poor	Poor	Fair	Unsuitable	Unsuitable	Unsuitable.
Poor	Poor	Good	Good	Good	Good	Good.
Poor	Poor	Poor	Good	Unsuitable	Unsuitable	Unsuitable.
Unsuitable	Poor	Poor	Good	Unsuitable	Unsuitable	Unsuitable.
Good	Good	Good	Poor	Unsuitable	Unsuitable	Unsuitable.
Poor	Good	Good	Poor	Unsuitable	Unsuitable	Unsuitable.

Bear.—This is the principal area in the county for black bear. These animals like extensive woodland that has few openings, few people, and an abundance of food in great variety. Among the important bear foods in this area are wild apples, cherries, blueberries, blackberries, raspberries, high-bush cranberries, dogwood berries, beechnuts, and acorns. Bear are not so common in Belknap County as elsewhere in the State.

Other game species.—The New England cottontail is fairly common in the lower parts of this area, especially in brushy tracts and sapling thickets. Gray squirrels occur throughout this area, particularly where there are many oaks, beeches, butternuts, and hazelnuts. They are not so common, however, as in the lower areas. Moose wander into the area occasionally.

Nongame species.—Many people are interested in the nongame species of wildlife. Among the birds of spruce-fir areas are a number of warblers and thrushes. In the hardwood and mixed woodland areas are numerous kinds of vireos, warblers, and woodpeckers. Open and brushy areas provide habitat for sparrows, flycatchers, warblers, and blackbirds. Other nongame species are porcupines, red squirrels, red-backed mice, woodland jumping mice, chipmunks, and weasels.

Furbearers.—Beaver are less common here than in the other wildlife areas, and the few that occur are more likely to be along the slower flowing streams of the limited bottom lands than in the mountains. Wherever there are swamps and an abundance of poplar and willow, beaver sooner or later appear.

Wildcats, red foxes, gray foxes, raccoons, minks, fishers, and other furbearers also occur in this wildlife area. Wildcats are fairly common throughout the area, especially where there are ledges. They hunt snowshoe hares, chipmunks, deer, mice, red squirrels, and gray squirrels. Red foxes probably have decreased as farmland has been abandoned and grown up to woods. Brushy pastures, meadows, and the edges of woods are their habitat. They eat meadow mice, woodchucks, and cottontails, all of which are mostly in farming areas. Gray foxes, which prefer woodland, are scarce. Racoons are common, especially near lakes, ponds, and streams. Minks, although not abundant, are of high economic value. Fishers occur in this area, but not abundantly.

WILDLIFE AREA 2

This area is made up of soil associations 1, 2, and 5. Most of it is in the northwestern section, but parts of it are scattered throughout the county. It consists of sand plains, gravel plains, and terraces occupied by Windsor, Hinckley, and Au Gres soils and of gently sloping to rolling uplands occupied by Gloucester, Paxton, Shapleigh, and Whitman soils.

This area is largely forested. Farm fields generally are small, scattered, and stony. Sugar maple, beech, white pine, hemlock, red oak, and red pine are predominant. White birch, gray birch, red maple, white oak, white ash, basswood, and butternut also occur. The droughtiness of some soils and the wetness of others slow the growth of conifers and create a situation generally favorable for wildlife. Shrubby oak, sweetfern, low-bush blueberry, and pin cherry are among the low-growing plants useful to wildlife. In the wetter areas, high-bush blueberry, dogwood, and poplar are important.

Intensive harvesting of softwoods permits the growth of hardwood trees and shrubs that provide favorable habitat for deer, hare, and grouse.

Deer.—The many native forage plants, the coniferous cover, the small pastures and meadows, and the swamps make this area a good deer habitat.

Snowshoe hare.—The population of snowshoe hare has varied from near extinction to moderate abundance. Young conifers, particularly spruce and fir, provide good habitat; the sapling-size gray birch and poplar, which often follow heavy cutting, provide fair habitat.

Ruffed grouse.—The many meadow and pasture edges, overgrown fields, cutover areas, brushy stone walls and roadsides, and alder swamps, together with limited coniferous cover, make this area favorable for grouse. Despite the quality of the habitat, however, grouse frequently become scarce.

Woodcock.—As woodcock habitat, this area is superior to area 1. The swampy Whitman soils provide good forage. The open, brushy areas and the groves of sapling birch and poplar, which follow cutting or invade abandoned fields, provide nesting grounds. The shallow, somewhat droughty Shapleigh soils can be used for nesting and rearing broods.

Other game species.—Scattered fields, overgrown stone walls, brushy and cutover areas, and young woodlands make this area superior to area 1 as a habitat for the New

England cottontail. The prevalence of oak, beech, ash, and other food-producing plants in this area provides good habitat for gray squirrels.

Wood duck and black duck, in limited numbers, nest or stop over during migration in the marshes and swamps in soil associations 1 and 5. Other kinds of waterfowl, notably goldeneyes and mergansers, are to be found on the Pemigewasset River. Mergansers spend the winter there.

Nongame species.—The wetlands of this area are especially good for birds. Common species are yellow warblers, yellow throats, bitterns, green herons, and blue herons.

Furbearers.—The very poorly drained Whitman soils, the areas of muck and peat, and the marshes are good sites for beaver, which are common. The low gradient of streams is favorable for the construction of beaver dams.

The many wet areas are also attractive to raccoons, minks, muskrats, and other furbearers.

WILDLIFE AREA 3

This area encompasses soil association 4, which is the largest in the county and includes the principal farmland and residential sites. It is made up of Paxton, Shapleigh, and Woodbridge soils on drumlinlike hills.

Dairy farms and apple orchards are prevalent in this area. The woodland is composed of beech, white birch, sugar maple, red oak, hemlock, and white pine. American elm, red maple, willow, and other lowland trees are common in hedgerows and along stream borders.

Deer.—The pastures and hay meadows that are common in this farmland area are grazed by deer early in spring and in summer. Deer consume daily about 2½ pounds of forage, dry weight, per 100 pounds of flesh. Unless deer are abundant, they seldom do much permanent damage to hay or pasture. Limed and fertilized grasses and legumes are especially attractive to them. Waste apples and apple buds are eaten—the latter sometimes to a damaging extent.

Ruffed grouse.—Grouse frequent overgrown pastures and abandoned fields in this area. They feed on apple buds and may seriously limit the apple crop.

Other game species.—Cottontails are common along field and pasture borders and in overgrown and wooded areas. Gray squirrels occur throughout this area. Black duck, wood duck, and other waterfowl use the limited water areas for nesting and during migration. Pheasant are released annually in the county. The soils, which are mostly glacial till, as well as the type of farming and the size of the fields are not conducive to the natural production of pheasant, but there are possibilities for hunting preserves.

Nongame species.—More openland birds occur in this area than in the others. Typical of these are orioles, meadowlarks, redwinged blackbirds, bobolinks, catbirds, brown thrashers, and song and field sparrows. Other interesting wildlife typical of farmland are meadow jumping mice, meadow mice, woodchucks, and harmless snakes.

Furbearers.—Beaver occur in this area to some extent, and the flooding caused by their dams is sometimes a nuisance. Fields, pastures, orchards, and stone walls are good habitat for red foxes, skunks, and weasels. Muskrats and raccoons frequent the streams and farm ponds.

Soils in Engineering [5]

This section contains information about the use of soils as material in construction. Most of the information is presented in table 5, "Estimated soil properties significant in engineering," table 6, "Interpretations of the soils for engineering," and table 7, "Engineering test data."

These tables, with the soil map and information given elsewhere in this report, can be used by engineers to—

1. Make soil and land-use studies that will aid in selecting and developing industrial, business, residential, and recreational sites.
2. Plan the construction of drainage and irrigation systems, farm ponds, diversions, and other soil and water conservation structures.
3. Make preliminary evaluations of soil conditions that will aid in selecting locations for highways, airports, pipelines, cables, and buildings and in planning detailed soil surveys at the selected locations.
4. Locate sources of sand, gravel, topsoil, and other construction materials.
5. Correlate performance of engineering structures with soil mapping units and thus develop information that will be useful in designing and maintaining such structures.
6. Supplement information from other sources and make engineering maps and reports.
7. Develop other preliminary estimates for construction purposes pertinent to a specific area.

With the use of the soil map for identification, the engineering estimates and interpretations reported here can be useful for many purposes. It should be emphasized that they may not eliminate the need for sampling and testing at the site of specific engineering works involving heavy loads or excavations deeper than the depths of layers here reported. Even in these situations, the soil map is useful for planning more detailed field investigations and for suggesting the kinds of problems that may be expected.

Some of the terms used in this survey have special meanings in soil science that do not correspond with the meanings of the same terms in engineering. These terms are defined in the Glossary according to their meaning in soil science. For additional information about the soils, engineers may want to refer to "Descriptions of the Soils," "Formation, Morphology, and Classification of the Soils," and other sections of this survey.

Soil classification systems

The texture of the soils has been classified in table 5 according to the systems used by the U.S. Department of Agriculture (*19*), the American Association of State Highway Officials (AASHO) (*2*), and the U.S. Army Corps of Engineers (*22*). The latter two systems are described in the "PCA Soil Primer" (*10*).

Under the U.S. Department of Agriculture system, soils are classified according to texture, structure, color, and other morphological characteristics. The textural classifi-

[5] Prepared with the assistance of BRADFORD P. BATCHELDER, engineering specialist, SCS.

cation is in some ways comparable to the systems used by engineers.

Most highway engineers use the AASHO system, in which there are seven basic groups of soils ranging from group A–1 to A–7. Soils in group A–1 contain predominantly sand and gravel and generally have a high load-carrying capacity. Soils in group A–7 are composed predominantly of clay and have a low load-carrying capacity when wet.

Many engineers use the Unified Soil Classification System, in which soils are divided into three classes: (1) coarse grained, (2) fine grained, and (3) highly organic. The coarse-grained soils are divided into eight groups, ranging from well-graded clean gravel (GW) to clayey sand (SC). The fine-grained soils are divided into six groups, ranging from silty soil with a low liquid limit (ML) to organic silt and clay with a high liquid limit (OH). Highly organic soil is classified as Pt. The Unified Soil Classification System is used by the Soil Conservation Service in engineering work.

Estimated properties of the soils

In table 5 the soil series and the component mapping unit symbols are listed, and estimates are given of texture, permeability, available water capacity, shrink-swell potential and other soil properties. The estimates are based on test data from Belknap County and Merrimack County (*20*) and on experience of soil scientists and engineers. As the estimates are only for typical soils, some variation from these values can be expected. The estimates are for representative profiles, which are divided into layers significant in engineering. More detailed information about each soil is contained in the section "Descriptions of the Soils."

Permeability is the rate at which water moves through the undisturbed soil material. The estimates were based mainly on soil structure and texture and on tests of undisturbed cores of similar soils.

Available water capacity is the approximate amount of capillary water available to plants when the soil is wet to field capacity.

Shrink-swell potential indicates the degree of volume change to be expected with a change in moisture content. It is estimated primarily on the basis of the amount and type of clay present. Most of the soils in Belknap County are nonplastic to slightly plastic and have a low shrink-swell potential.

Susceptibility to frost action was estimated for the soils as they occur in place. Frost action is the heaving caused by ice lenses forming in the soil and the subsequent loss of strength as a result of excess moisture during thawing periods. Soils that have a high percentage of silt and very fine sand are highly susceptible to frost action.

The pH values are not shown in table 5. Most of the soils in Belknap County range from pH 5.0 to 5.8.

Engineering interpretations

In the paragraphs that follow, the soils of the county are discussed in relation to features that affect engineering work in general. This is followed by explanations of the items in table 6, in which the soils are rated as sources of construction material and features are listed that adversely affect engineering practices.

Most of the soils in Belknap County formed in glacial till and contain stones and boulders that interfere with excavation and the placement of fill. In some places stones and boulders have been removed from the surface but some are still in the soil profile.

Variation in depth to bedrock is also a common engineering problem in glacial till soils. The Shapleigh soils and other shallow soils generally have bedrock less than 20 inches from the surface; but they are interspersed with pockets of deeper soils, and careful investigation is necessary before excavation begins.

In some of the glacial till soils, such as Paxton, Woodbridge, and Ridgebury, a pan layer at a depth of 16 to 36 inches retards the downward movement of water. This is an undesirable feature that must be considered in planning irrigation and drainage systems, but it is a desirable feature in soils that are to be used as embankment material for a dam. On the other hand, if the pan layer is removed when the reservoir area is excavated, this area may have to be scarified and compacted in order to prevent leakage in ponds that have a slow inflow of water.

A perched water table or seepage layer occurs in some of the glacial till soils that have a pan layer. Underdrains may be needed if highways are located in these areas.

The Windsor, Hinckley, Deerfield, Au Gres, and Scarboro soils developed in coarse-textured glacial outwash and are generally very pervious. These soils are not suitable for farm ponds that store water above the original ground level. Dugout ponds may be successful in Au Gres and Scarboro soils where the water table is at or near the surface. The water level in the pond fluctuates with the water table. Deerfield, Au Gres, and Scarboro soils are easily drained, but careful planning is necessary to control erosion, sloughing, and slumping. Filters may be required in tile drains to prevent silt and fine sand from plugging the pipe.

The Podunk, Rumney, and other soils along streams are subject to flooding, and these soils are difficult to drain because they are nearly level and lack suitable outlets.

In table 6 soils are rated as sources of topsoil, sand, gravel, and road fill, and specific soil features are listed that affect highway location, farm pond construction, agricultural drainage, irrigation, and the construction of terraces, diversions, and waterways. This information is based on the estimated properties shown in table 5 and on test data in table 7.

Topsoil is used on slopes, road shoulders, ditchbanks, and other places where vegetation is needed. Normally only the surface layer is removed for topsoil. Wet, shallow, sandy, or gravelly soils are poor or unsuitable.

Soils in AASHO classification A–1 or A–3 are suitable sources of sand, and those in classification A–1 are suitable sources of gravel. In this county only the Hinckley soils are good sources of sand and gravel.

Road fill is generally placed below normal frost depth. Factors that determine suitability are load-carrying ability, compaction characteristics, workability, depth to water table, and depth to bedrock. Soils in AASHO classification A–1, A–2, and A–3 are good; those in A–4 are fair. Soils that are shallow to bedrock or very poorly drained are poor or not suitable.

TABLE 5.—*Estimated soil properties*

[Absence of data indicates

Soil series and map symbols	Depth to bedrock	Depth to seasonal high water table	Depth from surface	Classification
				USDA texture
	Feet	*Feet*	*Inches*	
Acton (AaB, AtB, AtC).	5+	1 to 2½	0 to 9	Fine sandy loam
			9 to 18	Loamy sand
			18 to 36	Gravelly loamy sand
Au Gres (AuB).	10+	0 to ½	0 to 8	Loamy sand
			8 to 23	Sand and loamy sand
			23 to 36	Sand
Charlton (CaB, CaC, CaD, ChB, ChC, ChD, ChE, CrD, CrE).	5+	3+	0 to 5	Loam and fine sandy loam
			5 to 48	Fine sandy loam and gravelly sand
Deerfield (DeA, DeB).	10+	1 to 2½	0 to 15	Loamy sand
			15 to 35	Loamy sand and coarse sand
Gloucester (GcB, GcC, GcD, GrB, GrC, GrD, GrE, GsD, GsE).	5+	3+	0 to 4	Sandy loam
			4 to 13	Coarse sandy loam
			13 to 44	Loamy sand and gravelly loamy sand
Gravel and Borrow pits (Gv).	----	----	----	----
Hinckley:				
Gravelly loamy sand (HrE).	10+	5+	0 to 8	Gravelly loamy sand
			8 to 50	Gravelly sand
Loamy sand (HsA, HsB, HsC).	----	----	0 to 8	Loamy sand
			8 to 13	Gravelly loamy sand
			13 to 50	Gravelly sand
Made land (Ma).	----	----	----	----
Marsh (Mh).	----	----	----	----
Mixed alluvial land, wet (Ml).	----	0	----	----
Muck and Peat (Mp).	----	0	----	----
Ondawa (Oh).	10+	3+	0 to 12	Fine sandy loam
			12 to 20	Fine sandy loam
			20 to 34	Loamy sand
Paxton (PaB, PaC, PaD, PnB, PnC, PnD, PnE).	5+	2+	0 to 8	Loam and fine sandy loam
			8 to 18	Sandy loam
			18 to 35	Sandy loam
Podunk (Po).	10+	[2] 1½	0 to 22	Fine sandy loam and loamy fine sand
			22 to 26	Loam
			26 to 36	Loamy fine sand
Ridgebury (RbA, RbB, RdA, RdB, RhA, RhB). (For Whitman part of RhA and RhB, see Whitman series.)	5+	0 to ½	0 to 7	Loam
			7 to 18	Sandy loam
			18 to 40	Gravelly sandy loam
Rock outcrop (Ro).	0	----	----	----
Rumney (Ru).	10+	[2] 0 to ½	0 to 26	Fine sandy loam
			26 to 48	Loamy fine sand
Scarboro (Sc).	10+	0	0 to 15	Fine sandy loam and sand
			15 to 33	Sand
Shapleigh (SgB, SgC, ShC, ShD, ShE, SoD, SoE). (For Gloucester part of these mapping units, see Gloucester series.)	1 to 1½	1 to 1½	0 to 17	Sandy loam and loamy sand

See footnotes at end of table.

significant in engineering

no estimates were made]

Classification—Continued		Percentage passing sieve[1] —			Permeability	Available water capacity	Shrink-swell potential	Susceptibility to frost action
Unified	AASHO	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)				
					Inches per hour	*Inches per inch of soil*		
SM	A-2 or A-4	85 to 95	85 to 90	30 to 40	0.63 to 2.0	0.13 to 0.17	Low to moderate.	Moderate.
SM	A-2	75 to 90	65 to 75	20 to 30	2.0 to 6.3	.08 to .13	Low	Moderate.
SM	A-2	70 to 80	55 to 65	13 to 25	2.0 to 6.3	.05 to .08	Low	Moderate.
SM	A-2	90 to 100	85 to 100	15 to 30	2.0 to 6.3	.08 to .17	Low	High.
SP, SM, SW-SM, or SP-SM.	A-3	85 to 100	80 to 100	2 to 15	0.63 to 2.0	.07 to .08	Low	High.
SP, SM, SW-SM, or SP-SM.	A-3	90 to 100	85 to 100	2 to 15	>6.3	.05 to .08	Low	High.
SM	A-4	85 to 90	75 to 85	35 to 45	0.63 to 2.0	.13 to .17	Low to moderate.	Moderate.
SM	A-2	75 to 80	60 to 70	20 to 35	0.63 to 2.0	.13 to .17	Low	Moderate.
SM	A-2	95 to 100	95 to 100	15 to 35	2.0 to 6.3	.08 to .13	Low	Moderate.
SP-SM or SM	A-2 or A-3	90 to 100	80 to 100	5 to 20	>6.3	.05 to .08	Low	Moderate.
SM	A-2	80 to 90	75 to 85	25 to 35	2.0 to 6.3	.08 to .13	Low	Low.
SM	A-2	75 to 80	65 to 75	20 to 30	2.0 to 6.3	.08 to .13	Low	Low.
SP-SM or SM	A-1	70 to 80	55 to 65	10 to 20	2.0 to 6.3	.05 to .08	Low	Low.
GP-GM	A-1	35 to 40	30 to 35	5 to 10	>6.3	.05 to .08	Low	Low.
GP	A-1	25 to 35	15 to 25	0 to 5	>6.3	.05 to .08	Low	Low.
SM	A-2	90 to 95	85 to 95	15 to 20	2.0 to 6.3	.08 to .13	Low	Low.
SP-SM	A-3	80 to 90	80 to 90	5 to 10	>6.3	.05 to .08	Low	Low.
SP	A-1	65 to 75	45 to 55	0 to 5	>6.3	.05 to .08	Low	Low.
								High.
ML	A-4	100	100	50 to 60	2.0 to 6.3	.13 to .17	Low	Moderate.
SM or ML	A-4	100	95 to 100	40 to 60	2.0 to 6.3	.08 to .13	Low	Moderate.
SM	A-2	100	75 to 85	20 to 30	>6.3	.05 to .08	Low	Moderate.
SM	A-4	80 to 85	75 to 85	35 to 45	0.63 to 2.0	.13 to .17	Moderate to low.	High.
SM or SC	A-2 or A-4	70 to 80	60 to 70	30 to 40	0.63 to 2.0	.13 to .17	Moderate to low.	High.
SM or SC	A-2 or A-4	75 to 85	70 to 80	30 to 40	0.20 to 0.63	.08 to .13	Moderate to low.	High.
ML	A-4	100	100	50 to 60	2.0 to 6.3	.17 to .23	Low	High.
SM or ML	A-4	100	95 to 100	40 to 60	2.0 to 6.3	.13 to .17	Low	High.
SM	A-2	100	70 to 80	20 to 30	2.0 to 6.3	.08 to .13	Low	High.
SM	A-4	80 to 90	75 to 85	40 to 50	0.63 to 2.0	.13 to .17	Moderate to low.	High.
SM or SC	A-4	80 to 90	75 to 85	35 to 45	0.63 to 2.0	.13 to .17	Moderate to low.	High.
SM or SC	A-4	80 to 85	75 to 85	35 to 45	0.2 to 0.63	.08 to .13	Moderate to low.	High.
ML	A-4	100	100	50 to 60	2.0 to 6.3	.17 to .23	Low	High.
SM	A-2 or A-4	95 to 100	85 to 95	20 to 40	2.0 to 6.3	.08 to .13	Low	High.
SM	A-2 or A-4	100	100	15 to 40	2.0 to 6.3	.08 to .13	Low	High.
SP-SM or SM	A-2 or A-3	90 to 100	80 to 90	5 to 15	>6.3	.05 to .08	Low	High.
SM	A-2	75 to 90	65 to 85	20 to 35	2.0 to 6.3	.08 to .13	Low	Low to moderate.

TABLE 5.—*Estimated soil properties*

Soil series and map symbols	Depth to bedrock	Depth to seasonal high water table	Depth from surface	Classification
				USDA texture
	Feet	*Feet*	*Inches*	
Suncook (Sy).	10+	[2] 3+	0 to 44	Fine sandy loam and loamy sand
Whitman (Wa).	5+	0	0 to 8	Loam
			8 to 17	Fine sandy loam
			17 to 41	Gravelly loam and gravelly sandy loam.
Windsor (WdA, WdB, WdC, WdE).	10+	5+	0 to 8	Loamy sand
			8 to 40	Loamy sand and fine sand
Woodbridge (WoB, WoC, WvB, WvC).	5+	1 to 2½	0 to 18	Loam and fine sandy loam
			18 to 32	Sandy loam and loamy sand

[1] Based on total material; estimates corrected for material from 3 to 10 inches in diameter.
[2] Periodically flooded.

TABLE 6.—*Interpretations*

Soil series and map symbols	Suitability as source of—			
	Topsoil [1]	Sand	Gravel	Road fill
Acton (AaB, AtB, AtC)	Fair	Not suitable	Not suitable	Fair to good
Au Gres (AuB)	Poor	Fair; poorly graded, mostly fine sands.	Not suitable	Fair
Charlton (CaB, CaC, CaD, ChB, ChC, ChD, ChE, CrD, CrE).	Good	Not suitable	Not suitable	Good
Deerfield (DeA, DeB)	Fair	Fair; poorly graded, mostly fine sands.	Poor	Good
Gloucester (GcB, GcC, GcD, GrB, GrC, GrD, GrE, GsD, GsE).	Fair	Not suitable	Not suitable	Good
Gravel and Borrow Pits (Gv). (Properties vary; no interpretations made.)				
Hinckley (HrE, HsA, HsB, HsC)	Poor	Good; sand, gravel, and cobbles mixed.	Good; sand, gravel, and cobbles mixed.	Good
Made land (Ma). (Properties vary; no interpretations made.)				
Marsh (Mh)	Not suitable	Not suitable	Not suitable	Not suitable

See footnotes at end of table.

significant in engineering—Continued

Classification—Continued		Percentage passing sieve[1] —			Permeability	Available water capacity	Shrink-swell potential	Susceptibility to frost action
Unified	AASHO	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)				
					Inches per hour	*Inches per inch of soil*		
SP, SM, or SP-SM.	A-2 or A-3	80 to 90	75 to 95	0 to 15	>6.3	.05 to .08	Low	Low.
ML or SM	A-4	80 to 90	75 to 85	40 to 60	0.63 to 2.0	.13 to .17	Low to moderate.	High.
SM	A-2 or A-4	80 to 90	70 to 80	30 to 40	0.63 to 2.0	.13 to .17	Low	High.
SM	A-2 or A-4	75 to 85	65 to 75	20 to 40	0.20 to 0.63	.13 to .17	Low	High.
SM	A-2	100	100	20 to 25	2.0 to 6.3	.08 to .13	Low	Low.
SM, SP-SM	A-2 or A-3	100	95 to 100	5 to 20	>6.3	.05 to .08	Low	Low.
SM or SC	A-2 or A-4	80 to 95	75 to 90	30 to 45	0.63 to 2.0	.13 to .17	Moderate to low.	High.
SM-SC	A-2 or A-4	85 to 95	75 to 85	30 to 40	0.2 to 0.63	.08 to .13	Moderate to low.	High.

of the soils for engineering

Highway location	Soil features affecting—					
	Farm ponds		Agricultural drainage	Irrigation	Terraces and diversions	Waterways
	Reservoir area	Embankment[2]				
Stoniness; seasonal high water table; seepage.	Rapid permeability; seasonal high water table.	Moderate permeability; fair stability; stoniness.	Seasonal high water table; seepage; stoniness.	Low water-holding capacity.	Stoniness; seepage.	Stoniness.
High water table; cut slopes unstable; high erodibility.	Very rapid permeability; high water table.	Rapid permeability; fair to poor stability.	Sloughing; high water table; discontinuous, moderately permeable layer at 8 to 23 inches.	Low water-holding capacity; rapid intake rate.	High water table; high erodibility.	High erodibility; high water table; may be subject to continuous flow; difficult to vegetate.
Stoniness	Moderate permeability; stoniness.	Moderate permeability; fair stability; stoniness	Not needed	High water-holding capacity.	Stoniness	Stoniness.
Seasonal high water table; cut slopes unstable.	Rapid permeability; seasonal high water table.	Rapid permeability.	Seasonal high water table; rapid permeability.	Seasonal high water table; low water-holding capacity.	Erodibility; difficult to vegetate.	Erodibility; difficult to vegetate.
Stoniness	Rapid permeability; stoniness.	Moderate permeability; fair stability; stoniness.	Not needed	Low water-holding capacity; rapid intake rate.	Stoniness	Stoniness.
Slopes difficult to vegetate.	Very rapid permeability.	Rapid permeability; fair to good stability.	Not needed	Low water-holding capacity; rapid intake rate.	Sand and gravel layers below 12 to 18 inches; difficult to vegetate.	Difficult to vegetate.
High water table; high compressibility.	Ponded most of the year.	Not suitable	Variable material.	Not irrigated	Not applicable.	Not applicable.

TABLE 6.—*Interpretations of the*

Soil series and map symbols	Suitability as source of—			
	Topsoil [1]	Sand	Gravel	Road fill
Mixed alluvial land, wet (Ml)	Fair	Not suitable	Not suitable	Poor
Muck and Peat (Mp)	Poor	Not suitable	Not suitable	Not suitable
Ondawa (Oh)	Good	Not suitable	Not suitable	Fair to good
Paxton (PaB, PaC, PaD, PnB, PnC, PnD, PnE)	Good	Not suitable	Not suitable	Fair
Podunk (Po)	Good	Not suitable	Not suitable	Fair to poor
Ridgebury (RbA, RbB, RdA, RdB, RhA, RhB) (For the Whitman component of RhA and RhB see Whitman series.)	Fair to poor	Not suitable	Not suitable	Fair
Rock outcrop (Ro)	Not suitable	Not suitable	Not suitable	Not suitable
Rumney (Ru)	Fair	Not suitable	Not suitable	Poor
Scarboro (Sc)	Poor	Poor to fair	Poor	Poor
Shapleigh (SgB, SgC, ShC, ShD, ShE, SoD, SoE) (For Gloucester component of these mapping units, see Gloucester series.)	Poor	Not suitable	Not suitable	Poor; shallow
Suncook (Sy)	Poor	Fair to good; poorly graded in places.	Poor	Good
Whitman (Wa)	Poor	Not suitable	Not suitable	Not suitable
Windsor (WdA, WdB, WdC, WdE)	Poor	Fair; poorly graded, mostly fine sands.	Not suitable	Fair to good
Woodbridge (WoB, WoC, WvB, WvC)	Good	Not suitable	Not suitable	Fair

[1] The rating does not include the stony phases of the respective series.
[2] Permeability for embankment refers to the soil material when compacted.

soils for engineering—Continued

Highway location	Soil features affecting— Farm ponds: Reservoir area	Farm ponds: Embankment [2]	Agricultural drainage	Irrigation	Terraces and diversions	Waterways
High water table; flooding.	Variable material; flooding.	Variable material.	Variable permeability; high water table; flooding.	Variable material; generally not irrigated.	Not applicable.	High water table.
High water table; compressible.	Water table at surface.	Not suitable.	Settlement after drainage; banks and bottom of ditches unstable.	Generally not irrigated.	Not applicable.	Not applicable.
Flooding.	Rapid permeability; flooding.	Moderate permeability; poor stability; poor resistance to piping.	Flooding.	Moderate water-holding capacity and intake rate.	Not applicable.	High erodibility.
Pan layer; seepage on cut slopes; stoniness.	Slow permeability; pan layer; stoniness.	Slow permeability; stoniness.	Pan layer at about 2 feet; stoniness.	Moderate water-holding capacity and intake rate.	Stoniness; pan layer at about 2 feet.	Stoniness; pan layer at about 2 feet.
Flooding; seasonal high water table.	Rapid permeability; flooding.	Moderate permeability; poor stability; poor resistance to piping.	Flooding; seasonal high water table; ditchbanks unstable in places.	Moderate to high water-holding capacity and intake rate.	Not applicable.	Seasonal high water table; high erodibility.
Pan layer; high water table; seepage; stoniness.	High water table; slow permeability; pan layer; stoniness.	Slow permeability; stoniness.	High water table; pan layer at 1½ to 2 feet; seepage; stoniness.	Moderate water-holding capacity and intake rate.	Stoniness; pan layer at 1½ to 2 feet; high water table; seepage.	Stoniness; pan layer at 1½ to 2 feet; high water table; seepage.
Bedrock at surface.	Not applicable.	Not applicable.	Not applicable.	Not applicable.	Not applicable.	Not applicable.
Flooding; high water table.	Moderate to rapid permeability; flooding.	Moderate to rapid permeability.	Flooding; moderate permeability; high water table.	High water table; generally not irrigated.	Not applicable.	Flooding.
High water table; cut slopes unstable.	Very rapid permeability; high water table.	Rapid permeability; piping.	High water table; sloughing; rapid permeability.	Generally not irrigated.	Not applicable.	High water table; difficult to vegetate.
Bedrock within 2 feet of surface; possible seepage over bedrock.	Shallowness to bedrock.	Rapid permeability.	Not needed.	Shallowness.	Shallowness to bedrock.	Shallowness to bedrock.
Flooding.	Very rapid permeability; flooding.	Very rapid permeability.	Not needed.	Low water-holding capacity; rapid intake rate.	Not applicable.	Not applicable.
High water table; stoniness; pan layer in places.	Moderate to slow permeability; high water table.	Moderate to slow permeability; stoniness.	High water table; pan layer in places.	Generally not irrigated.	Not applicable.	High water table; stoniness.
High erodibility; difficult to vegetate.	Very rapid permeability.	Very rapid permeability; piping.	Not needed.	Low water-holding capacity; rapid intake rate.	High erodibility; difficult to vegetate.	High erodibility; difficult to vegetate.
Seasonal high water table; seepage in cut slopes; stoniness.	Slow permeability; pan layer.	Slow permeability; stoniness.	Slow permeability; seasonal high water table; pan layer; stoniness.	Seasonal high water table; moderate water-holding capacity.	Pan layer at about 1½ to 2 feet; stoniness.	Pan layer at about 1½ to 2 feet; stoniness.

TABLE 7.—*Engineering*

[Tests performed by the Bureau of Public Roads (BPR) in accordance with standard

Soil name and location	Parent material	Bureau of public roads report No.	Depth	Horizon
			Inches	
Au Gres loamy sand:				
2.5 miles N. of Meredith. (Modal)	Water-sorted sand and gravel.	41833	0 to 7	Ap
		41834	20 to 24	IIB22
		41835	29 to 40	IIIC2
1 mile N. of Route 104 and 0.5 mile NE. of Dana Church Rd. on Dolloff Hill Rd. (Gravel-free variant)	Water-sorted sand.	41836	0 to 8	Ap
		41837	18 to 23	B22m
		41838	23 to 36	C
0.2 mile SE. of Cotton Hill Rd. on Route 107. (Sand A horizon variant)	Water-sorted sand and gravel.	41839	0 to 6	A2
		41840	12 to 16	IIIB2m
		41841	16 to 30	IIIC
Deerfield loamy sand:				
0.75 mile E. of Route 107 and 300 yards N. of Cotton Hill Rd. (Modal)	Water-sorted sand and gravel (kame terrace).	41869	0 to 8	Ap
		41870	8 to 15	B21
		41871	26 to 35	IIC1
1 mile N. of Route 104 on Dana Church Rd. (Gravel-free variant)	Water-sorted sand.	41872	0 to 8	Ap
		41873	12 to 25	B22
		41874	25 to 40	C
200 feet E. of Old Stage Rd. and 0.25 mile S. of Ayers Brook. (Sand B horizon variant)	Water-sorted sand.	41875	0 to 8	Ap
		41876	8 to 15	B21
		41877	23 to 50	C
Gloucester very stony sandy loam:				
1.25 miles E. and 100 yards N. of Alton. (Modal)	Glacial till.	41842	0 to 4	A1
		41843	4 to 13	B21
		41844	24 to 44	C
1 mile E. of Route 28 along Alton to Merrymeeting Lake Rd. (Platy C horizon variant)	Glacial till.	41845	0 to 5	Ap
		41846	9 to 16	B22
		41847	26 to 40	C2
200 yards E. of Hills Pond. (Gravelly variant)	Glacial till.	41848	0 to 5	B21
		41849	5 to 14	B22
		41850	24 to 46	C2
Paxton loam:				
0.25 mile N. of Lochmere substation. (Modal)	Glacial till, drumlin.	41851	0 to 6	Ap
		41852	11 to 22	B22
		41853	22 to 42	Cx
3 miles NW. of Route 28 on Beauty Hill. (Shallow to pan)	Glacial till, drumlin.	41854	0 to 5	Ap
		41855	5 to 11	B2
		41856	15 to 30	Cx
0.75 mile SE. of Lochmere substation. (Coarse-textured C horizon variant)	Glacial till.	41857	1 to 7	B21
		41858	7 to 13	B22
		41859	19 to 48	Cx
Ridgebury loam:				
1.5 miles SE. of Loon Pond and 100 yards NE. of Route 107. (Modal).	Glacial till.	41860	0 to 6	Ap
		41861	22 to 39	B22x
		41862	50 to 65	Cx
1.75 miles SE. of Lochmere substation and 100 feet SW. of road. (Sandy C horizon variant)	Glacial till.	41863	0 to 9	Ap
		41864	9 to 15	B21g
		41865	24 to 33	Cx
3 miles NW. of Route 28 on Beauty Hill. (Weak pan variant)	Glacial till.	41866	0 to 8	Ap
		41867	11 to 22	B21
		41868	22 to 36	B22x

See footnotes at end of table.

test data

procedures of the American Association of State Highway Officials (AASHO) (*2*)]

Mechanical analysis [1]													Classification	
Estimated percentage larger than 3 inches discarded in field sampling	Percentage passing sieve [2]						Percentage smaller than [2]				Liquid limit	Plasticity index	AASHO	Unified [3]
	3-in.	¾-in.	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.				
	----	100	98	94	70	19	15	8	3	2	[4] NP	[4] NP	A-2-4(0)--	SM.
	----	100	93	83	33	5	4	2	2	2	NP	NP	A-1-b(0)--	SW-SM.
	----	100	99	98	84	14	8	3	2	1	NP	NP	A-2-4(0)--	SM.
	----	----	-----	100	91	29	22	14	7	5	NP	NP	A-2-4(0)--	SM.
	----	----	-----	100	80	12	8	4	1	1	NP	NP	A-2-4(0)--	SP-SM.
	----	----	-----	100	78	5	3	2	1	1	NP	NP	A-3(0)----	SP-SM.
	100	99	95	87	56	22	16	5	2	2	NP	NP	A-2-4(0)--	SM.
	100	94	88	79	31	2	2	2	2	2	NP	NP	A-1-b(0)--	SP.
	100	95	91	86	36	2	2	2	2	2	NP	NP	A-1-b(0)--	SP.
	100	99	97	95	82	35	28	15	7	6	NP	NP	A-2-4(0)--	SM.
	----	----	100	99	91	25	18	10	5	3	NP	NP	A-2-4(0)--	SM.
	----	100	97	88	57	4	4	3	2	1	NP	NP	A-3(0)----	SP.
	----	----	-----	100	94	31	25	15	7	4	NP	NP	A-2-4(0)--	SM.
	----	----	-----	100	81	7	6	5	5	3	NP	NP	A-3(0)----	SP-SM.
	----	----	-----	100	93	15	9	2	1	1	NP	NP	A-2-4(0)--	SM.
	----	100	99	97	74	25	21	15	8	6	NP	NP	A-2-4(0)--	SM.
	----	----	100	98	71	14	10	6	4	2	NP	NP	A-2-4(0)--	SM.
	----	----	100	99	79	18	13	8	4	1	NP	NP	A-2-4(0)--	SM.
	100	96	91	88	70	33	28	16	6	4	NP	NP	A-2-4(0)--	SM.
10	90	83	75	70	52	21	17	8	2	2	NP	NP	A-2-4(0)--	SM.
20	80	70	60	54	38	11	9	4	2	1	NP	NP	A-1-b(0)--	SM.
50	50	34	-----	30	26	13	11	7	3	2	NP	NP	A-2-4(0)--	SM.
	100	89	81	76	61	27	22	12	3	2	NP	NP	A-2-4(0)--	SM.
	100	98	94	91	76	35	29	15	6	3	NP	NP	A-2-4(0)--	SP-SM.
15	85	84	79	72	50	20	15	10	4	3	NP	NP	A-2-4(0)--	SM.
10	90	85	77	66	46	18	13	8	4	2	NP	NP	A-2-4(0)--	SM.
	100	96	88	78	52	13	9	5	3	2	NP	NP	A-2-4(0)--	SM.
7	93	91	88	85	69	44	40	27	13	6	42	9	A-5(2)----	SM.
19	81	76	70	67	57	40	36	29	16	9	28	7	A-4(3)----	SM-SC.
5	95	88	82	78	66	42	40	30	15	9	21	5	A-4(2)----	SM-SC.
	100	85	77	73	58	33	30	18	10	6	37	11	A-2-6(0)--	SM-SC.
	100	82	74	71	58	33	29	21	12	7	32	7	A-2-4(0)--	SM-SC.
	100	97	92	88	72	40	35	27	16	10	22	6	A-4(1)----	SM-SC.
3	97	86	81	78	64	32	28	16	8	6	NP	NP	A-2-4(0)--	SM.
3	97	95	90	86	69	33	27	19	12	6	NP	NP	A-2-4(0)--	SM.
10	90	82	75	68	55	23	20	14	7	5	NP	NP	A-2-4(0)--	SM.
	100	93	90	88	76	48	45	31	16	11	41	8	A-5(3)----	SM.
10	90	87	86	85	75	45	40	31	19	13	21	8	A-4(3)----	SC.
12	88	88	86	84	76	51	47	34	20	13	22	7	A-4(5)----	ML-CL.
	100	85	79	78	67	41	38	24	12	7	36	10	A-4(1)----	SM-SC.
	100	97	91	86	69	35	31	20	11	7	17	3	A-2-4(0)--	SM.
5	95	91	86	85	72	36	32	21	11	9	18	3	A-4(1)----	SM.
	100	94	89	84	70	41	38	28	17	11	39	10	A-4(1)----	SM.
6	94	87	83	79	64	35	31	24	15	10	20	5	A-4(0)----	SM-SC.
6	94	86	81	76	62	35	31	23	13	8	20	5	A-4(0)----	SM-SC.

TABLE 7.—*Engineering*

Soil name and location	Parent material	Bureau of public roads report No.	Depth	Horizon
			Inches	
Woodbridge loam:				
0.75 mile SE. of Webster Stream and 2 miles SW. of Alton-Barnstead town line. (Modal)	Glacial till, drumlin	41878	0 to 8	Ap
		41879	8 to 12	B21
		41880	20 to 36	Cx
1.75 miles SE. of Lochmere substation and 100 yards SW. of road. (Sandy C horizon variant)	Glacial till, drumlin	41881	0 to 7	Ap
		41882	7 to 15	B21
		41883	20 to 30	Cx
3 miles NW. of Route 28 on Beauty Hill. (Loam C horizon variant)	Glacial till, drumlin	41884	0 to 8	Ap
		41885	8 to 15	B21
		41886	22 to 36	Cx

[1] Mechanical analysis according to the AASHO Designation T 88–57 (*2*). Results by this procedure frequently may differ somewhat from results that would have been obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analyses used in this table are not suitable for use in naming textural classes for soil.

Highway location depends on such factors as compressibility, the hazards of flooding and seepage, stability of slopes, susceptibility to frost action, and depth to water table and to bedrock. In soils that are moderately well drained to very poorly drained, a seasonal high water table makes earthwork difficult and may limit working time to the months of July and August. If highway cuts are to be located where the water table is high, a survey should be made to determine the need for interceptor drains and underdrains. Roadways in areas subject to flooding should be built on embankments. Seepage along the back slopes of cuts may cause slumping or sliding of the underlying material. To avoid high construction costs, highway locations should be planned so that deep cuts will not have to be made in bedrock. If highways have to be located in areas of muck and peat, these highly compressible organic materials should be removed and replaced with more desirable backfill to minimize settlement.

In the construction of farm ponds, a particular soil feature may be a problem in the reservoir but not in the embankment. Permeability, stability, shrink-swell potential, resistance to piping, and depth to bedrock are the major soil features considered. Interpretations can be made from these columns for the construction of dikes, levees, lagoons, and sedimentation pools.

Agricultural drainage includes surface and subsurface drainage systems. Features that affect construction of such systems are a high water table, seepage, permeability, flooding, sloughing, and depth to bedrock.

Irrigation is affected by such features as soil depth, water-holding capacity, permeability, and intake rate. Only sprinkler irrigation was considered.

In the construction and maintenance of terraces, diversions, and waterways, the factors to be considered include seepage, erodibility, shallowness to bedrock or pan layer, presence of stones, and difficulty in obtaining good vegetative cover.

Engineering test data

Table 7 contains test data on soil samples from selected soil series in Belknap County. These tests were made by the Bureau of Public Roads.

One sample of each series represents the central, or modal, concept of the series. The other samples represent extremes in texture, depth of profile, or other variations from the central concept. All samples in table 7 were obtained to specific depths as indicated in the table. Therefore, the test data should not be used as a basis for estimating the properties of layers below those sampled.

The tests for liquid limit and plastic limit measure the effect of water on the consistence of the soil material. The plastic limit is the moisture content at which the soil material passes from a semisolid to a plastic state. The liquid limit is the moisture content at which the material passes from a plastic to a liquid state. The plasticity index is the numerical difference between the liquid limit and plastic limit. It indicates the ranges of moisture content within which a soil material is in a plastic condition.

The mechanical analysis was made by a combination of the sieve and hydrometer methods. Percentages of clay determined by the hydrometer method should not be used in naming soil textural classes.

Soils in Recreational Development

This section contains information about the suitability of the soils for recreation sites. The information can be used as a planning guide. It does not take the place of on-site investigations, nor does it constitute recommendations for use of the soils. The sections "General Soil Map," "Descriptions of the Soils," and "Soils in Engineering"

test data—Continued

Mechanical analysis [1]														
Estimated percentage larger than 3 inches discarded in field sampling	Percentage passing sieve [2]						Percentage smaller than [2]				Liquid limit	Plasticity index	Classification	
	3-in.	¾-in.	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.			AASHO	Unified [3]
----------	100	99	96	92	75	44	40	29	15	9	41	9	A-5(2)----	SM.
----------	100	95	91	87	69	38	35	24	12	6	27	5	A-4(1)----	SM-SC.
----------	100	95	90	86	70	39	35	27	16	9	20	4	A-4(1)----	SM-SC.
----------	100	94	91	88	75	46	40	26	12	7	39	10	A-4(2)----	SM.
----------	100	92	88	83	66	31	27	17	8	4	NP	NP	A-2-4(0)--	SM.
----------	100	99	95	91	74	39	35	29	18	10	18	4	A-4(1)----	SM-SC.
----------	100	93	86	82	66	37	34	25	14	9	38	9	A-4(0)----	SM.
8	92	81	75	72	61	37	34	25	14	9	28	6	A-4(1)----	SM-SC.
8	92	86	81	76	62	33	29	24	15	9	22	6	A-4(0)----	SM-SC.

[2] Based on total material. Laboratory test data corrected for amount discarded in field sampling.
[3] SCS and BPR have agreed to consider that all soils having plasticity indexes within two points from A-line are to be given a borderline classification. Examples of borderline classifications are SW-SM and SP-SM.
[4] NP=Nonplastic.

contain additional information that can be used in planning for recreation.

Each recreation enterprise is made up of components that impose certain requirements on the soils of the site. The kind of recreation varies, but certain components are common to most enterprises. For example, most recreation enterprises require building sites, sanitary facilities, play areas, and roads and parking areas.

Individual soils cannot be determined to be suitable for a recreation enterprise except in a general way. Therefore, major components common to most recreation enterprises have been selected, and the soils have been rated in table 8 according to their limitations for those components. The specific limiting features of the soils are also given.

Building sites referred to in table 8 are for buildings without basements, for example, cottages, summer homes, lodges, and service buildings. Construction on concrete, wooden, or steel columns is assumed. Limitations for sanitary facilities are rated separately. For information about buildings with basements, see the section "Soils in Community Development."

Tent site ratings are based on seasonal use. Limitations for sanitary facilities and other improvements are not included.

Sanitary facility limitations are rated on the basis of use of septic tanks during summer. Onsite investigation is necessary.

Play areas are divided according to intensive and extensive use. Examples of intensive-use areas are athletic fields and playgrounds. Parks and picnic grounds are extensive-use areas.

Parking areas and roads are unpaved. Ratings for areas that are paved or have a macadam surface are given in the section "Soils in Community Development."

Dug ponds are excavated below the original ground level and are supplied mostly by ground water. For pond dams, the soils are rated as a borrow source for core material only.

Vegetative cover ratings are for the establishment and maintenance of grass cover only. For information about trees, see the section "Soils in Woodland Management." Limitations for vegetative cover are not considered in the ratings for play areas, building sites, and tent sites, although vegetation is important in such sites.

Soils in Community Development

The information in this section can aid planners, realtors, builders, and others interested in community development. It does not take the place of onsite investigations, nor does it contain recommendations for specific uses of the soil. Additional information can be obtained from the sections "Soils in Engineering" and "Descriptions of the Soils."

Table 9 shows the degree of limitation of each soil for seven selected uses in community development, as well as the specific limiting features of each soil. Regardless of the ratings shown in this table, onsite investigations are necessary.

The ratings of the soils for use as septic tank disposal fields (fig. 8, p. 58) are based on year-round use.

Sewage lagoons are shallow ponds built to dispose of sewage through the process of oxidation. It is assumed that the natural soil below a depth of 1 foot will be used both as the reservoir site and as a source of embankment material.

Homesites, as referred to in the table, are for year-round buildings in community subdivisions. The buildings are three stories or less and have basements that extend to a depth of at least 5 feet below normal ground level.

TABLE 8.—*Limitations of soils*

[Limitations are *slight* if problems are insignificant, and the problems are not listed; limitations are *moderate*

Soil series and map symbols	Building sites (for buildings without basements)	Tent sites	Sanitary facilities (seasonal use)	Play areas
				Intensive use (athletic fields)
Acton:				
(AaB)	Slight	Slight	Moderate: seasonal high water table.	Moderate: slope
(AtB)	Moderate: surface stones.	Slight	Moderate: seasonal high water table.	Moderate: slope
(AtC)	Moderate: surface stones.	Moderate: slope	Moderate: seasonal high water table.	Severe: slope
Au Gres:				
(AuB)	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Charlton:				
(CaB)	Slight	Slight	Slight	Moderate: slope
(CaC)	Moderate: slope	Moderate: slope	Moderate: slope	Severe: slope
(CaD)	Severe: slope	Severe: slope	Severe: slope	Severe: slope
(ChB)	Moderate: surface stones.	Moderate: surface stones.	Slight	Moderate: slope
(ChC)	Moderate: surface stones.	Moderate: surface stones.	Moderate: slope	Severe: slope
(ChD, ChE, CrD, CrE)	Severe: slope	Severe: slope; surface stones.	Severe: slope; surface stones.	Severe: slope; surface stones.
Deerfield:				
(DeA, DeB)	Slight	Slight	Moderate: seasonal high water table.	Moderate: slope
Gloucester:				
(GcB)	Slight	Slight	Slight	Moderate: slope
(GcC)	Moderate: slope	Moderate: slope	Moderate: slope	Severe: slope
(GcD)	Severe: slope	Severe: slope	Severe: slope	Severe: slope
(GrB)	Moderate: surface stones.	Moderate: surface stones.	Slight	Moderate: slope
(GrC)	Moderate: surface stones.	Moderate: surface stones.	Moderate: slope	Severe: slope
(GrD, GrE, GsD, GsE)	Severe: slope	Severe: slope; surface stones.	Severe: slope	Severe: slope; surface stones.
Gravel and Borrow pits: (Gv) Properties are variable; no interpretations made.				
Hinckley:				
(HrE)	Severe: slope	Severe: slope	Severe: slope	Severe: slope
(HsA, HsB)	Slight	Moderate: droughtiness.	Slight	Moderate: slope
(HsC)	Moderate: slope	Moderate: droughtiness.	Moderate: slope	Severe: slope
Made land: (Ma) Properties are variable; no interpretations made.				
Marsh:				
(Mh)	Severe: ponded	Severe: ponded	Severe: ponded	Severe: ponded
Mixed alluvial land, wet:				
(Ml)	Severe: frequent flooding.	Severe: frequent flooding.	Severe: frequent flooding.	Severe: frequent flooding.
Muck and Peat:				
(Mp)	Severe: water table at surface.	Severe: water table at surface.	Severe: water table at surface.	Severe: water table at surface.

See footnotes at end of table.

for recreational development

if problems involve moderate cost and effort, and *severe* if problems involve high cost and intensive effort]

Play areas—Continued	Parking areas and roads (unpaved)	Ponds		Vegetative cover
Extensive use (parks and picnic areas)		Dug ponds	Core material for pond dams	
Slight	Moderate: seasonal high water table.	Severe: fluctuating water table.	Moderate: leakage	Slight.
Slight	Moderate: seasonal high water table.	Severe: fluctuating water table.	Moderate: leakage	Moderate: surface stones.
Moderate: slope	Moderate: seasonal high water table.	Severe: fluctuating water table; slope.	Moderate: leakage	Moderate: surface stones.
Severe: high water table.	Severe: high water table.	Slight to moderate: slope.	Severe: leakage	Moderate: high water table.
Slight	Slight	Severe: water table below a depth of 5 feet.	Slight	Slight.
Moderate: slope	Moderate: slope	Severe: slope	Slight	Slight.
Severe: slope	Severe: slope	Severe: slope	Slight	Moderate: slope.
Slight	Moderate: surface stones.	Severe: water table below a depth of 5 feet.	Moderate: surface stones.	Moderate: surface stones.
Moderate: slope	Moderate: surface stones.	Severe: slope	Moderate: surface stones.	Moderate: surface stones.
Severe: slope; surface stones.	Severe: slope; surface stones.	Severe: slope	Moderate: surface stones.	Severe: surface stones; slope.
Slight	Moderate: seasonal high water table.	Severe: seasonal high water table.	Severe: leakage	Slight.
Slight	Slight	Severe: water table below a depth of 5 feet.	Severe: leakage	Moderate: droughtiness.
Moderate: slope	Moderate: slope	Severe: slope	Severe: leakage	Moderate: droughtiness.
Severe: slope	Severe: slope	Severe: slope	Severe: leakage	Moderate: droughtiness.
Slight	Moderate: surface stones.	Severe: water table below a depth of 5 feet.	Severe: leakage	Moderate: droughtiness.
Moderate: slope	Moderate: surface stones.	Severe: slope	Severe: leakage	Moderate: droughtiness.
Severe: slope	Severe: slope	Severe: slope	Severe: leakage	Severe: surface stones; slope.
Severe: slope	Severe: slope	Severe: slope	Severe: leakage	Severe: droughtiness.
Moderate: droughtiness	Slight	Severe: water table below a depth of 5 feet.	Severe: leakage	Severe: droughtiness.
Moderate: droughtiness	Moderate: slope	Severe: slope	Severe: leakage	Severe: droughtiness.
Severe: ponded	Severe: ponded	Severe: [1] poor stability	Severe: poor stability	Severe: ponded.
Severe: frequent flooding.	Severe: frequent flooding.	Severe: frequent flooding.	Severe: frequent flooding.	Severe: frequent flooding.
Severe: water table at surface.	Severe: water table at surface.	Severe: poor stability	Severe: poor stability	Severe: water table at surface.

TABLE 8.—*Limitations of soils for*

Soil series and map symbols	Building sites (for buildings without basements)	Tent sites	Sanitary facilities (seasonal use)	Play areas
				Intensive use (athletic fields)
Ondawa: (Oh)	Moderate: flooding	Moderate: flooding	Moderate: flooding	Severe: flooding
Paxton: (PaB)	Slight	Slight	Severe: slow permeability.	Moderate: slope
(PaC)	Moderate: slope	Moderate: slope	Severe: slow permeability.	Severe: slope
(PaD)	Severe: slope	Severe: slope	Severe: slow permeability.	Severe: slope
(PnB)	Moderate: surface stones.	Moderate: surface stones.	Severe: slow permeability.	Moderate: slope
(PnC)	Moderate: surface stones.	Moderate: surface stones.	Severe: slow permeability.	Severe: slope
(PnD, PnE)	Severe: slope	Severe: slope	Severe: slow permeability.	Severe: slope
Podunk: (Po)	Severe: flooding	Moderate: flooding	Severe: flooding	Severe: flooding
Ridgebury: (RbA, RbB)	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
(RdA, RdB, RhA, RhB) (For Whitman part of RhA and RhB, see Whitman series).	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Rock outcrop: (Ro)	Severe: bedrock exposures.	Severe: bedrock exposures.	Severe; bedrock exposures.	Severe: bedrock exposures.
Rumney: (Ru)	Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding.
Scarboro: (Sc)	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Shapleigh: (SgB)	Slight	Slight	Severe: shallow to bedrock.	Severe: shallow to bedrock.
(SgC)	Moderate: slope	Moderate: slope	Severe: shallow to bedrock.	Severe: shallow to bedrock.
(ShC)	Severe: bedrock exposures.	Moderate; slope	Severe: bedrock exposures.	Severe: bedrock exposures.
(ShD, ShE, SoD, SoE) (For Gloucester part of these mapping units, see Gloucester series.)	Severe: bedrock exposures.	Severe: bedrock exposures.	Severe: bedrock exposures.	Severe: bedrock exposures.
Suncook: (Sy)	Severe: frequent flooding.	Severe: frequent flooding.	Severe: frequent flooding.	Severe: frequent flooding.
Whitman: (Wa)	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Windsor: (WdA, WdB)	Slight	Moderate: droughtiness.	Slight	Moderate: droughtiness.
(WdC)	Moderate: slope	Moderate: droughtiness.	Moderate: slope	Severe: slope
(WdE)	Severe: slope	Severe: slope	Severe: slope	Severe: slope

See footnotes at end of table.

recreational development—Continued

Play areas—Continued	Parking areas and roads (unpaved)	Ponds		Vegetative cover
Extensive use (parks and picnic areas)		Dug ponds	Core material for pond dams	
Slight	Moderate: flooding	Severe: water table below a depth of 5 feet.	Moderate: leakage	Slight.
Slight	Moderate: seepage	Severe: water table below a depth of 5 feet.	Slight	Slight.
Moderate: slope	Severe: slope	Severe: slope	Slight	Slight.
Severe: slope	Severe: slope	Severe: slope	Slight	Moderate: slope.
Slight	Moderate: seepage	Severe: water table below a depth of 5 feet.	Moderate: surface stones.	Moderate: surface stones.
Moderate: slope	Severe: slope	Severe: slope	Moderate: surface stones.	Moderate: surface stones.
Severe: slope	Severe: slope	Severe: slope	Moderate: surface stones.	Severe: slope.
Moderate: flooding	Severe: flooding	Severe: flooding	Severe: leakage	Slight.
Severe: high water table.	Severe: high water table.	Moderate: slope	Slight	Moderate: high water table.
Severe: high water table	Severe: high water table.	Moderate: slope	Moderate: surface stones.	Severe: surface stones.
Severe: bedrock exposures.	Severe: bedrock exposures.	Severe: bedrock exposures.	Severe: bedrock exposures.	Severe: [2] bedrock exposures.
Severe: high water table; flooding.	Severe: high water table; flooding.	Moderate: flooding	Severe: leakage	Moderate: high water table; flooding.
Severe: high water table.	Severe: high water table.	Slight	Severe: leakage	Severe: high water table.
Slight	Moderate: shallow to bedrock.	Severe: shallow to bedrock.	Severe: shallow to bedrock.	Slight.
Moderate: slope	Moderate: shallow to bedrock.	Severe: shallow to bedrock.	Severe: shallow to bedrock.	Slight.
Severe: bedrock exposures.	Severe: bedrock exposures.	Severe: bedrock exposures.	Severe: bedrock exposures.	Moderate: bedrock exposures.
Severe: bedrock exposures.	Severe: bedrock exposures.	Severe: bedrock exposures.	Severe: bedrock exposures.	Severe: bedrock exposures.
Moderate: frequent flooding.	Severe: frequent flooding.	Severe: frequent flooding.	Severe: leakage	Severe: droughtiness.
Severe: high water table.	Severe: high water table.	Slight	Moderate: leakage	Severe: high water table.
Moderate: droughtiness	Slight	Severe: water table below a depth of 5 feet.	Severe: leakage	Severe: droughtiness.
Moderate: droughtiness	Moderate: slope	Severe: water table below a depth of 5 feet.	Severe: leakage	Severe: droughtiness.
Severe: slope	Severe: slope	Severe: water table below a depth of 5 feet.	Severe: leakage	Severe: droughtiness.

TABLE 8.—*Limitations of soils for*

Soil series and map symbols	Building sites (for buildings without basements)	Tent sites	Sanitary facilities (seasonal use)	Play areas
				Intensive use (athletic fields)
Woodbridge:				
(WoB)	Slight	Moderate: seasonal high water table.	Severe: slow permeability.	Moderate: slow permeability.
(WoC)	Moderate: slope	Moderate: seasonal high water table.	Severe: slow permeability.	Severe: slope
(WvB)	Moderate: surface stones.	Moderate: seasonal high water table.	Severe: slow permeability.	Moderate: slow permeability.
(WvC)	Moderate: surface stones.	Moderate: seasonal high water table.	Severe: slow permeability.	Severe: slope

[1] Marsh may have a high potential for marine development where associated with lakes.
[2] Rock outcrop may have scenic value.

TABLE 9.—*Limitations of soils*

[Limitations are *slight* if problems are insignificant, and the problems are not listed; limitations are *moderate*

Soil series and map symbols	Septic tank disposal fields (year-round use)	Sewage lagoons	Homesites (for houses of 3 stories or less, with basements)
Acton:			
(AaB)	Severe: seasonal high water table.	Severe: seepage	Moderate: seasonal high water table.
(AtB)	Severe: seasonal high water table.	Severe: seepage	Moderate: seasonal high water table.
(AtC)	Severe: seasonal high water table.	Severe: seepage and slope	Moderate: seasonal high water table.
Au Gres:			
(AuB)	Severe: high water table	Severe: seepage	Severe: high water table
Charlton:			
(CaB)	Slight	Moderate: seepage	Slight
(CaC)	Moderate: slope	Severe: slope	Moderate: slope
(CaD)	Severe: slope	Severe: slope	Severe: slope
(ChB)	Slight	Moderate: seepage	Moderate: stones
(ChC)	Moderate: slope	Severe: slope	Moderate: slope
(ChD)	Severe: slope	Severe: slope	Severe: slope
(ChE, CrD, CrE)	Severe: slope; stones	Severe: slope; stones	Severe: slope; stones
Deerfield:			
(DeA, DeB)	Severe: seasonal high water table.	Severe: seepage	Moderate: seasonal high water table.
Gloucester:			
(GcB)	Slight	Severe: seepage	Slight
(GcC)	Moderate: slope	Severe: seepage; slope	Moderate: slope
(GcD)	Severe: slope	Severe: slope	Severe: slope
(GrB)	Slight	Severe: seepage	Moderate: stones
(GrC)	Moderate: slope	Severe: seepage; slope	Moderate: slope
(GrD)	Severe: slope	Severe: seepage; slope	Severe: slope
(GrE, GsD, GsE)	Severe: slope; stones	Severe: seepage; slope	Severe: slope; stones
Gravel and Borrow pits:			
(Gv) Properties are variable; no interpretations made.			
Hinckley:			
(HrE)	Severe :[1] slope	Severe: seepage; slope	Severe: slope
(HsA)	Slight [1]	Severe: seepage	Slight
(HsB)	Slight [1]	Severe: seepage	Slight
(HsC)	Moderate :[1] slope	Severe: seepage; slope	Moderate: slope
Made land:			
(Ma) Properties are variable; no interpretations made.			
Marsh:			
(Mh)	Severe: ponded	Severe: high content of organic matter.	Severe: ponded

See footnote at end of table.

recreational development—Continued

Play areas—Continued	Parking areas and roads (unpaved)	Ponds		Vegetative cover
Extensive use (parks and picnic areas)		Dug ponds	Core material for pond dams	
Slight	Severe: seepage	Severe: fluctuating water table.	Slight	Slight.
Moderate: slope	Severe: seepage	Severe: fluctuating water table.	Slight	Slight.
Slight	Severe: seepage	Severe: fluctuating water table.	Moderate: surface stones.	Moderate: surface stones.
Moderate: slope	Severe: seepage	Severe: fluctuating water table.	Moderate: surface stones.	Moderate: surface stones.

for community development

if problems involve moderate cost and effort, and *severe* if problems involve high cost and intensive effort]

Lawns and landscaping	Streets and parking lots (paved)	Sanitary land fill (trench method)	Cemeteries
Slight	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.
Severe: stones	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Severe: stones.
Severe: stones	Severe: slope	Moderate: seasonal high water table.	Severe: stones.
Severe: high water table	Severe: high water table	Severe: high water table	Severe: high water table.
Slight	Moderate: slope	Slight	Slight.
Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: stones	Moderate: slope	Moderate: stones	Severe: stones.
Severe: stones	Severe: slope	Moderate: stones	Severe: stones.
Severe: stones; slope	Severe: slope	Severe: slope	Severe: stones.
Severe: slope; stones	Severe: slope; stones	Severe: slope; stones	Severe: slope; stones.
Moderate: sandy surface layer	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.
Moderate: droughtiness	Moderate: slope	Slight	Moderate: droughtiness.
Moderate: droughtiness	Severe: slope	Moderate: slope	Moderate: droughtiness.
Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: stones	Moderate: slope	Moderate: stones	Severe: stones.
Severe: stones	Moderate: slope	Moderate: stones	Severe: stones.
Severe: stones; slope	Severe: slope	Severe: slope	Severe: stones.
Severe: slope; stones	Severe: slope; stones	Severe: slope; stones	Severe: slope; stones.
Severe: droughtiness; slope	Severe: slope	Severe: slope	Severe: slope.
Severe: droughtiness	Slight	Slight	Severe: droughtiness.
Severe: droughtiness	Moderate: slope	Slight	Severe: droughtiness.
Severe: droughtiness	Severe: slope	Moderate: slope	Severe: droughtiness.
Severe: ponded	Severe: ponded	Severe: ponded	Severe: ponded.

TABLE 9.—*Limitations of soils for*

Soil series and map symbols	Septic tank disposal fields (year-round use)	Sewage lagoons	Homesites (for houses of 3 stories or less, with basements)
Mixed alluvial land, wet: (Ml)	Severe: frequent flooding	Severe: frequent flooding	Severe: frequent flooding
Muck and Peat: (Mp)	Severe: high water table	Severe: high content of organic matter.	Severe: high water table
Ondawa: (Oh)	Severe: flooding	Severe: flooding	Severe: flooding
Paxton: (PaB)	Severe: slow permeability	Moderate: seepage	Moderate: seepage
(PaC)	Severe: slow permeability	Severe: slope	Moderate: seepage
(PaD)	Severe: slow permeability	Severe: slope	Severe: slope
(PnB)	Severe: slow permeability	Moderate: seepage	Moderate: seepage
(PnC)	Severe: slow permeability	Severe: slope	Moderate: seepage
(PnD)	Severe: slow permeability	Severe: slope	Severe: slope
(PnE)	Severe: slow permeability	Severe: slope	Severe: slope
Podunk: (Po)	Severe: seasonal high water table; flooding.	Severe: flooding	Severe: flooding
Ridgebury: (RbA, RdA, RhA)	Severe: high water table	Slight	Severe: high water table
(RbB, RdB, RhB) (For Whitman part of RhA and RhB, see Whitman series).	Severe: high water table	Moderate: slope	Severe: high water table
Rock outcrop: (Ro)	Severe: bedrock exposures	Severe: bedrock exposures	Severe: bedrock exposures
Rumney: (Ru)	Severe: high water table; flooding.	Severe: flooding	Severe: high water table; flooding.
Scarboro: (Sc)	Severe: high water table	Severe: seepage	Severe: high water table
Shapleigh: (SgB, SgC)	Severe: shallowness to bedrock.	Severe: shallowness to bedrock.	Severe: shallowness to bedrock.
(ShC, ShD, ShE, SoD, SoE) (For Gloucester part of these mapping units, see Gloucester series).	Severe: bedrock exposures	Severe: bedrock exposures	Severe: bedrock exposures
Suncook: (Sy)	Severe: frequent flooding	Severe: seepage; frequent flooding.	Severe frequent flooding
Whitman: (Wa)	Severe: high water table	Moderate: seepage	Severe: high water table
Windsor: (WdA)	Slight [1]	Severe: seepage	Slight
(WdB)	Slight [1]	Severe: seepage	Slight
(WdC)	Moderate: [1] slope	Severe: seepage; slope	Moderate: slope
(WdE)	Severe: [1] slope	Severe: seepage; slope	Severe: slope
Woodbridge: (WoB)	Severe: slow permeability	Moderate: slope	Moderate: seasonal high water table.
(WoC)	Severe: slow permeability	Severe: slope	Moderate: seasonal high water table.
(WvB)	Severe: slow permeability	Moderate: slope	Moderate: seasonal high water table.
(WvC)	Severe: slow permeability	Severe: slope	Moderate: seasonal high water table.

[1] Possible pollution of nearby lakes, springs, or shallow wells.

community development—Continued

Lawns and landscaping	Streets and parking lots (paved)	Sanitary land fill (trench method)	Cemeteries
Severe: frequent flooding	Severe: frequent flooding	Severe: frequent flooding	Severe: frequent flooding.
Severe: high water table	Severe: high water table	Severe: high water table	Severe: high water table.
Moderate: flooding	Moderate: flooding	Severe: flooding	Severe: flooding.
Slight	Moderate: slope	Severe: slow permeability	Severe: slow permeability.
Moderate: slope	Severe: slope	Severe: slow permeability	Severe: slow permeability.
Severe: slope	Severe: slope	Severe: slow permeability	Severe: slow permeability.
Severe: stones	Moderate: slope	Severe: slow permeability	Severe: slow permeability.
Severe: stones	Severe: slope	Severe: slow permeability	Severe: slow permeability.
Severe: stones; slope	Severe: slope	Severe: slow permeability	Severe: slow permeability.
Severe: stones; slope	Severe: slope	Severe: slow permeability	Severe: slow permeability.
Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding.
Severe: high water table	Severe: high water table	Severe: high water table	Severe: high water table.
Severe: high water table	Severe: high water table	Severe: high water table	Severe: high water table.
Severe: bedrock exposures	Severe: bedrock exposures	Severe: bedrock exposures	Severe: bedrock exposures.
Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding.
Severe: high water table	Severe: high water table	Severe: high water table	Severe: high water table.
Moderate: shallowness to bedrock.	Severe: shallowness to bedrock.	Severe: shallowness to bedrock.	Severe: shallowness to bedrock.
Severe: bedrock exposures	Severe: bedrock exposures	Severe: bedrock exposures; slope.	Severe: bedrock exposures.
Severe: frequent flooding	Severe: frequent flooding	Severe: frequent flooding	Severe: frequent flooding.
Severe: high water table	Severe: high water table	Severe: high water table	Severe: high water table.
Severe: droughtiness	Slight	Slight	Severe: droughtiness.
Severe: droughtiness	Moderate: slope	Slight	Severe: droughtiness.
Severe: droughtiness	Severe: slope	Moderate: slope	Severe: droughtiness.
Severe: droughtiness; slope	Severe: slope	Severe: slope	Severe: slope.
Slight	Moderate: seasonal high water table.	Severe: slow permeability	Severe: slow permeability.
Moderate: slope	Severe: slope	Severe: slow permeability	Severe: slow permeability.
Severe: stones	Moderate: seasonal high water table.	Severe: slow permeability	Severe: slow permeability.
Severe: stones	Severe: slope	Severe: slow permeability	Severe: slow permeability.

Figure 8.—Sewage effluent on the surface of Shapleigh sandy loam. Soil is too shallow to absorb effluent.

Ratings for lawns and landscaping are based on soil properties that limit the establishment and maintenance of lawns and shrubs. It is assumed that the lawns will be subject to moderate foot traffic and that no importation of fill or topsoil will be used.

Streets and parking lots referred to in the table are hard surfaced and are in community subdivisions. Major State and interstate highways are not included.

Sanitary landfill refers to the use of the soils as disposal areas for trash and garbage. It is assumed the landfill operation will be by the trench method, which involves digging out an area and using the excavated soil material to cover the waste. Importation of fill or cover is not considered.

Cemetery ratings are for community cemeteries. It is assumed that there will be no importation of fill or topsoil. Soil properties that affect the establishment and maintenance of grass were also considered.

Formation, Morphology, and Classification of the Soils

Soils are natural three-dimensional bodies on the earth's surface. Soils contain living matter and support the growth of plants.

Formation of the Soils

Soils are formed through the integrated effect of climate and living organisms acting on parent material, conditioned by topography and time. The relative importance of each factor differs from place to place. In some places one factor may have more influence than another, but, normally, all five factors combined determine what the soil will be. Figure 9 shows the varying influence of the soil-forming factors on the major soils of the county.

Climate

Belknap County has a continental climate characterized by long, cold winters and short, warm summers. The average annual temperature is about 46°F., and the average annual precipitation is 40 to 42 inches. There are local variations, however, due to differences in elevation. More information about the temperature and precipitation in the county is given in the section "Climate."

Temperature and rainfall govern the rates of physical and chemical weathering of soils (*17*). They influence chemical reactions and the leaching of soluble materials from the soils. Because of the county's humid, temperate climate, the soils are strongly leached and, consequently, are strongly acid and have low fertility.

Weathering continues in the soils, but at a slow rate, especially during the winter when the ground is frozen (*16*). Alternate freezing and thawing in the spring and fall has some value in promoting granulation.

Plant and animal life

In Belknap County, climate, topography, and parent material have had greater influence on the soils than plants and animals. Plants influence the formation of soils mainly by adding organic matter.

The first settlers in Belknap County found a forest cover consisting mostly of hardwood and white pine. The county is in the transitional zone between the central hardwoods and the northern hardwoods. White oak, chestnut, hemlock, sugar maple, birch, and white pine are common in this transitional zone. The different kinds of forests and other native vegetation had some association with drainage. Hardwood stands originally occupied most of the better drained soils. Hardwoods and spruce prevailed in the wet areas. Red pine and white pine were dominant in the valleys and near the lakes. Some spruce and balsam fir grew in the mountains.

Hardwood forests use a large amount of bases, which are returned to the soil when the leaves fall (*14*). As the soils of Belknap County have low fertility, few bases are returned to the soil and the soils remain acid even under hardwood vegetation. Pines do not require a large amount of bases and contribute little to the fertility of the soil.

With the development of agriculture, man has become a soil-forming factor. Man affected soil formation by clearing the forests and cultivating the land. He changed the soil by mixing the upper horizons, by cultivating the steep slopes and causing erosion, and by adding lime and fertilizer. By his practices he gradually changed the forest cover so that it has an increased proportion of white pine.

Bacteria, fungi, and other micro-organisms decompose organic matter and add humus to soil. Earthworms, rodents, and other forms of animal life also change organic matter and thereby affect the formation of soil.

Parent material

From 90 to 95 percent of all the soils in the county formed in glacial till, which consists of fragments of various sizes from clay to boulders. Most of the till was coarse

grained because, during the dumping process, fine-grained materials were washed away (*5*). The Shapleigh, Gloucester, and Acton soils formed in coarse-grained till. Some of the till, however, accumulated through the process of lodgment, or plastering on (*5*). This took place through gradual transfer of drift from the basal ice to the ground beneath the ice. The flowing ice molded these deposits into rounded hills called drumlins, the largest groups of which are in the town of Barnstead (*8*). Soils that formed in this kind of till have more silt and clay than those that formed in till deposited by the dumping process. The Charlton, Paxton, Woodbridge, and Ridgebury soils formed in this kind of till.

Glaciofluvial deposits accumulated as water from the melting ice picked up the smaller particles and carried them on (*7*). The material was sorted according to grain size, and outwash plains and terraces were formed of bedded sand and gravel. A few glaciofluvial deposits are in the form of kames and eskers in which there is extreme range in grain size. The Hinckley soils formed in bedded sand and gravel on kames, eskers, outwash plains, and terraces. The Windsor, Deerfield, Au Gres, and Scarboro soils formed in sand on plains and terraces.

Quartzite and coarse-grained mica schist underlie about 70 percent of the county. Quartz diorite and quartz monzonite underlie the northeastern part, and granite underlies part of Belknap Mountain (*3*). The character of this underlying bedrock, however, is not necessarily reflected in the soils of the county.

A few soils in the county are forming in alluvial sediments deposited by present-day streams. The Suncook, Ondawa, and Podunk are forming in alluvium.

Organic, or bog, soils are forming in deposits of muck and peat throughout the county. They are in formerly ponded depressions where plant remains have accumulated over a long time. Organic deposits in Belknap County are classified as a land type (Muck and Peat) and not as a soil series.

Topography

Topography affects runoff and drainage and thereby influences soil formation. Steep slopes produce a large amount of runoff and rapid drainage.

The topography of most of Belknap County is rolling and sloping. There are two steep mountainous areas, one in the northwestern and one in the east-central part of the county. The outwash plains and narrow flood plains are nearly level or gently undulating. The highest point in the county is the top of Belknap Mountain, 2,378 feet above sea level. The lowest point, about 320 feet above sea level, is in the Pemigewasset Valley.

Belknap County is entirely within the Northern New England Uplands. It is, for the most part, a dissected plateau sloping to the south and east. Although the entire county was covered with ice during the glacial period, the general appearance was probably not materially changed by glaciation (*8*). Local changes occurred, however, where some areas were planed off and others were built up. The most notable landforms produced by glaciation are the drumlins in the southern part of the county.

Soils differ because of different topography, even though they formed in the same kind of parent material. For example the Paxton, Woodbridge, Ridgebury, and Whitman soils all formed in loamy till. The Paxton soils are deep to bedrock, are well drained, have a fragipan at a depth of about 2 feet, and are sloping. The slope is not steep enough to encourage erosion and not so nearly level as to prevent runoff. The Woodbridge soils are moderately well drained and have a fragipan in the subsoil. They are gently sloping; consequently, runoff is medium to slow and much of the surface water enters the soil. The Ridgebury soils are poorly drained and also have a fragipan in the subsoil. They formed in depressions. The Whitman soils are very poorly drained. They receive runoff from adjoining sloping to steep soils, but they produce little runoff because of their nearly level topography. Table 10 shows the soil series arranged to show the relationship between topographic position, parent material, and drainage.

Time

Time is a passive but important soil-forming factor. Degree of profile development reflects the age of a soil, but it reflects the influence of other factors as well.

A mature soil has well-defined horizons. An immature soil has not had enough time for distinct horizons to form. Soils that have been forming for the same length of time in the same parent material but on different topography do not necessarily show the same stage of profile development. If the slope is steep, geologic erosion is rapid and the soil is somewhat immature. Alluvial soils on flood plains are very immature because of the continual accumulation of sediments.

The Gloucester soils have been in place long enough to have distinct horizons. The rate of weathering exceeds the rate of geologic erosion. These are mature soils. The Ondawa soils are forming in alluvial sediments on flood plains. They are immature because the deposition of fresh alluvium prevents the formation of horizons.

Morphology of the Soils

Most of the soils of Belknap County have moderate to strong horizonation. The Suncook, Ondawa, and Podunk soils, which are forming in alluvium, are the exceptions.

The differentiation of horizons in the soils of the county involves several soil-forming processes. The most important of these are (1) additions of organic matter, (2) transformation and transfer of organic matter and sesquioxides, (3) chemical weathering of primary minerals or rock and parent material into silicate clay, and (4) chemical change and transfer of iron. One or more of these processes have taken place in all the soils in the county, but the degree of activity varies from soil to soil.

Organic matter has accumulated in all the soils to form an A1 or an Ap horizon. The A1 horizon may have been changed by plowing and cultivation, into an Ap horizon. Part or all of the A1 horizon may have been removed by erosion. The amount of organic matter added to the surface of the soil varies. Suncook and Windsor soils have very small amounts of organic matter in the A1 horizon, while the A1 horizon of the very poorly drained Whitman series is high in organic-matter content.

The process most important in the formation of horizons in the soils of Belknap County involves the movement of organic matter and sesquioxides out of the A and into the B horizon. This process is called podzolization. Under acid conditions, the decomposition of organic matter in the A horizon dissolves sesquioxides, reduces iron, and

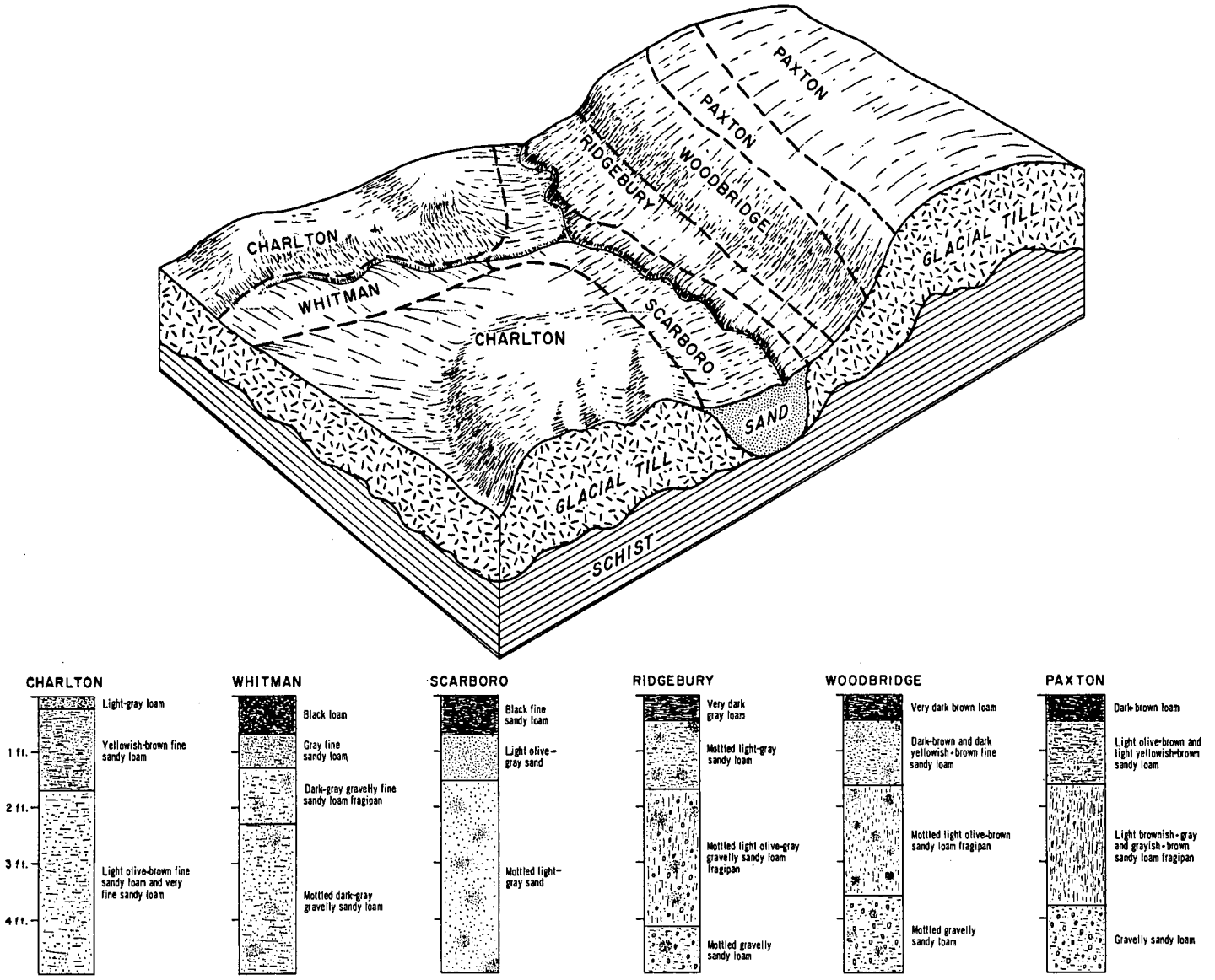


***Figure 9.*—Diagrams of two typical landscapes, showing the varying**

forms soluble metal-organic complexes (*13*). These complexes move out of the A horizon and into the B horizon, where they are precipitated under oxidizing conditions. The intensity of this soil-forming process determines the degree of podzolization. A thin, faint, leached A2 horizon may form over an accumulation of humus and sesquioxides in the B horizon. In places the A2 horizon is absent.

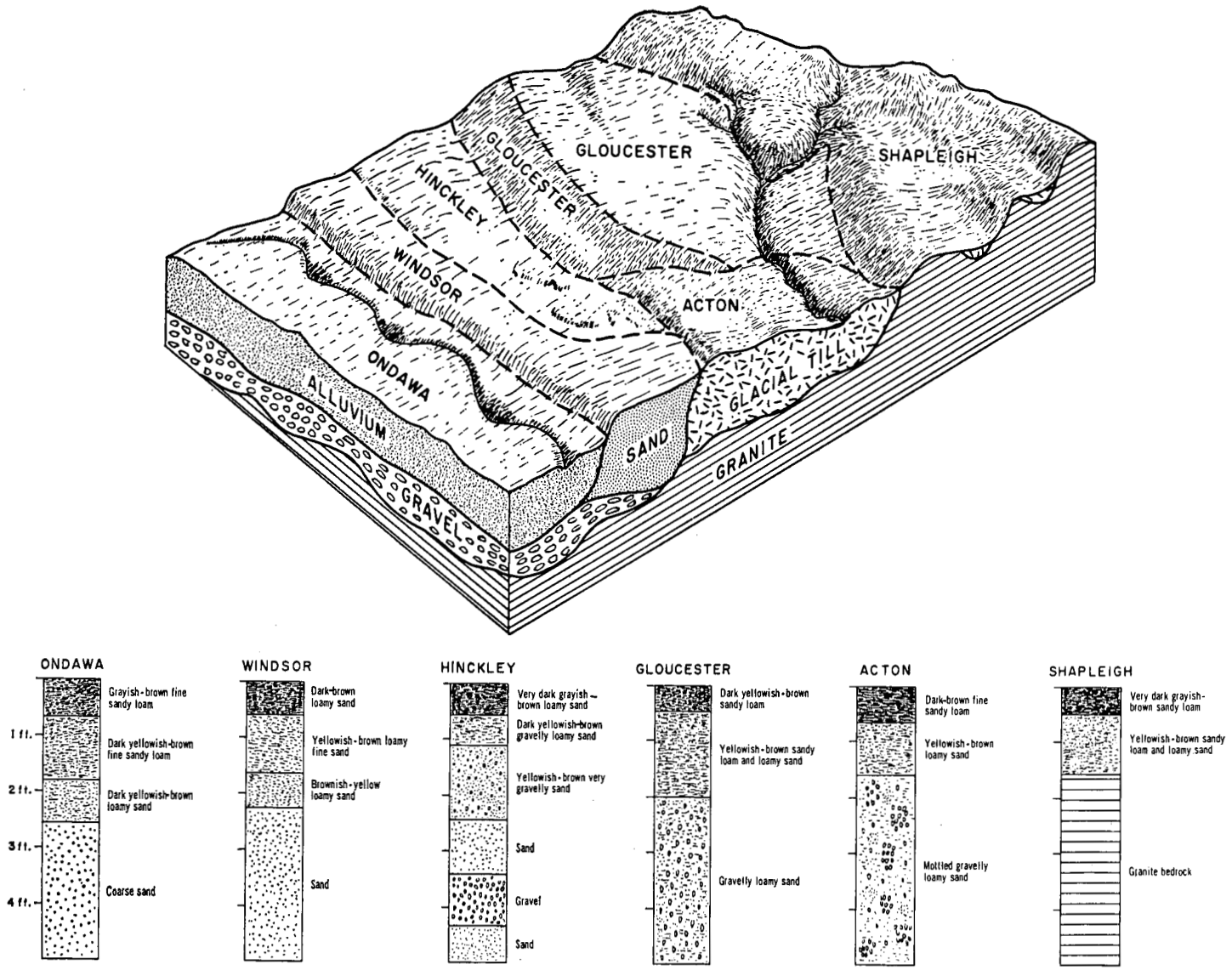
Weak podzolization is most evident in the Gloucester, Windsor, and other well-drained soils.

The reduction and transfer of iron compounds, a process known as gleying (*16*) is characteristic of soils that have impeded drainage. It is especially evident in Ridgebury, Whitman, and other poorly drained soils. Iron has been removed from some of the soils entirely, but in others it may have stopped in the horizon where it originated. Part of this iron may be reoxidized and segregated to form the yellowish-red, strong-brown, or yellowish-brown mottles commonly found in the moderately well drained and poorly drained soils.

Many of the soils of Belknap County have a distinct fragipan. Little is known about the genesis of this pan. It is believed, however, that it did not form during the current cycle of soil development. Field examinations show little translocation of clay. The eluvial-illuvial sequence (A2 and B2 horizon designations) seems to be lacking or weakly expressed. In some places, however, flows of silt or clay are evident, indicating pedogenic processes.

Classification of the Soils

Soils are placed in narrow classes so that we can identify them and apply knowledge about their use and manage-



influence of the five soil-forming factors on the major soils of the county.

ment to small areas, such as farms and counties. They are placed in broad categories for the study and comparison of large areas, such as countries or continents. Soil series, types, and phases are the categories most commonly used for the study of small areas. These are defined in the section "How This Survey Was Made."

Two systems of classifications have been used in the United States. One is the 1938 system, revised (*15*, *16*), which consisted of the order, suborder, great soil group, family, series, and type. By 1965, this system had been replaced because it was incomplete and did not sufficiently emphasize the observable and measurable characteristics of soil. The current system (*18*) consists of the order, suborder, great group, subgroup, family, series, and type. Placement of soil series in this system, especially in the families, may change as more precise information becomes available.

Table 11 shows the soil series classified by the order, subgroup, and family of the current system and the order and great soil group of the 1938 system. The classes in the current system are briefly defined in the following paragraphs. A description of each soil series in the county, including a representative profile of the series, can be found in the section "Descriptions of the Soils."

Orders.—In the current system of classification there are ten orders. They are Entisols, Vertisols, Inceptisols, Aridisols, Mollisols, Spodosols, Alfisols, Ultisols, Oxisols, and Histosols. The properties used to differentiate soil orders are those that tend to give broad climatic groupings of soils. Two exceptions are the Entisols and Histosols, which occur in many different climates. Only three soil orders are represented by the soils in Belknap County. They are the Entisols, Inceptisols, and Spodosols.

TABLE 10.—*Soil series arranged to show relationship between position, parent material, and drainage*

Parent material	Excessively drained	Somewhat excessively drained	Well drained	Moderately well drained	Poorly drained	Very poorly drained
SOILS ON BOTTOM LANDS						
Coarse textured and moderately coarse textured alluvial sediments of mixed mineralogy.	Suncook		Ondawa	Podunk [1]	Rumney [2]	
SOILS ON OUTWASH PLAINS AND TERRACES						
Stratified sand and gravel deposits, mainly from granite, gneiss, and schist.	Hinckley				Au Gres [2]	Scarboro.
Sand deposits with little or no gravel, mainly from granite, gneiss, and schist.	Windsor			Deerfield [1]	Au Gres [2]	Scarboro.
SOILS ON UPLANDS						
Coarse textured and moderately coarse textured glacial till, mainly from granite, gneiss, and schist.		Shapleigh [3]	Charlton, Gloucester.	Acton [1]	Ridgebury [2]	Whitman.
Moderately coarse textured, compact glacial till, mainly from schist and granite.			Paxton	Woodbridge.[1]	Ridgebury [2]	Whitman.

[1] Extends into the upper range of the somewhat poorly drained class.

[2] Extends into the lower range of the somewhat poorly drained class.

[3] Shallow to bedrock.

TABLE 11.—*Soil series classified according to the current system and the 1938 system*

Series [1]	Current classification system			1938 classification system	
	Family	Subgroup	Order	Great soil group	Order
Acton	Sandy, mixed, mesic	Aquentic Haplorthods	Spodosol	Brown Podzolic	Zonal.
Au Gres	Sandy, mixed, frigid	Entic Haplaquods	Spodosol	Ground-Water Podzol	Intrazonal.
Charlton	Coarse-loamy, mixed, mesic	Entic Haplorthods	Spodosol	Brown Podzolic	Zonal.
Deerfield	Sandy, mixed, mesic	Aquentic Haplorthods	Spodosol	Brown Podzolic	Zonal.
Gloucester	Sandy, mixed, mesic	Entic Haplorthods	Spodosol	Brown Podzolic	Zonal.
Hinckley	Sandy-skeletal, mixed, mesic	Entic Haplorthods	Spodosol	Brown Podzolic	Zonal.
Ondawa	Coarse-loamy, mixed, mesic	Fluventic Dystrochrepts	Inceptisol	Alluvial	Azonal.
Paxton	Coarse-loamy, mixed, mesic	Entic Fragiorthods	Spodosol	Brown Podzolic	Zonal.
Podunk	Coarse-loamy, mixed, mesic	Aquic Fluventic Dystrochrepts.	Inceptisol	Alluvial	Azonal.
Ridgebury	Coarse-loamy, mixed, mesic	Aquic Fragiochrepts	Inceptisol	Low-Humic Gley	Intrazonal.
Rumney	Coarse-loamy, mixed, acid, mesic.	Fluventic Haplaquepts	Inceptisol	Low-Humic Gley	Intrazonal.
Scarboro	Mixed, mesic	Typic Psammaquents	Entisol	Humic Gley	Intrazonal.
Shapleigh	Sandy, mixed, mesic	Entic Lithic Haplorthods	Spodosol	Brown Podzolic	Zonal.
Suncook	Mixed, mesic	Typic Udipsamments	Entisol	Alluvial	Azonal.
Whitman	Coarse-loamy, mixed, mesic	Typic Fragiaquepts	Inceptisol	Humic Gley	Intrazonal.
Windsor	Sandy, mixed, mesic	Entic Haplorthods	Spodosol	Brown Podzolic	Zonal.
Woodbridge	Coarse-loamy, mixed, mesic	Aquic Entic Fragiorthods	Spodosol	Brown Podzolic	Zonal.

[1] Muck and Peat is not included; it is classified as a land type rather than as a soil series in Belknap County.

Entisols are "recent" soils. They show only slight modification of the original geologic materials. In this county the principal modification is the weak development of an A1 horizon called an ochric epipedon. The Suncook series is an example.

Inceptisols are soils that have started to develop characteristic properties in the various horizons. The Rumney series is an example. It has a well-formed, very dark colored A1 horizon and a weakly-formed subsurface horizon called a cambic horizon.

Spodosols are soils that have a distinctive horizon called a spodic horizon. In the Spodosols of Belknap County, this diagnostic subsurface horizon consists of an illuvial accumulation of free sesquioxides and organic carbon. The Gloucester series is representative of this order.

Suborders.—Orders are divided into suborders, pri-

marily on the basis of those soil characteristics that seem to produce classes having the greatest genetic similarity. Suborders narrow the broad climatic range permitted in the orders. The soil properties used to differentiate suborders mainly reflect either the presence or absence of waterlogging or the soil differences resulting from the climate or vegetation. Suborders are not shown in table 11.

Great groups.—Suborders are divided into great groups on the basis of uniformity in the kinds and sequence of major soil horizons and features. The horizons on which the divisions are based are those in which clay, iron, or humus have accumulated. The features on which the divisions are based are the self-mulching properties of clays, soil temperature, major differences in chemical composition (mainly calcium, magnesium, sodium, and potassium), and the like. The name of each great group is the last word in the name of the subgroup. The great groups in the current system are not shown in table 11.

Subgroups.—Great groups are divided into subgroups. One of the subgroups in each great group represents the central (typic) segment of the group, and the others, called intergrades, have properties of another great group, suborder, or order. Subgroups may also be made in those instances where soil properties intergrade outside the range of any other great group, suborder, or order. The names of subgroups are derived by placing one or more adjectives before the name of the great group. An example is Typic Psammaquents (a typical Psammaquent).

Families.—Subgroups are divided into families primarily on the basis of properties important to the growth of plants or to the behavior of soils used for engineering. Among the properties considered are texture, mineralogy, reaction, soil temperature, permeability, thickness of horizons, and consistence. An example of a family is the mixed, mesic family of Typic Psammaquents.

Physical and Chemical Properties of the Soils

Laboratory data and profile descriptions for three selected soils common to Belknap and Merrimack Counties have been published in the Soil Survey, Merrimack County, New Hampshire (*20*). The soils analyzed are of the Au Gres, Paxton, and Ridgebury series. The physical and chemical properties, shown in table form, are helpful in characterizing and classifying the soils and in understanding their genesis. The information also is useful in making interpretations for use and management.

Climate [6]

Moderately warm summers, cold winters, and ample rainfall are characteristic of Belknap County. The Atlantic Ocean, 30 to 60 miles to the southeast, occasionally affects the weather. The prevailing wind is from the northwest, though it is frequently from the southwest in summer. The climate, therefore, is influenced much more by continental air than by air from the ocean.

As is typical of a dominantly continental climate, temperature varies greatly from winter to summer and from day to night. Day to day variation is also common, as the county is near the paths of weather systems that alternately bring warmer air from the south and colder air from the north. The county's many lakes and ponds have a moderating influence on the climate, especially in summer, when they cool the immediate shore areas on the warmer days. In wintertime the moderating effect is less marked. Away from the shores, the lake influence is minor.

Elevation and topography also affect weather. Generally, the average temperature is lower and the precipitation is greater at higher elevations. Local differences in topography influence the occurrence of spring and fall freezes and are, therefore, of importance in the selection of crops.

Table 12 contains temperature and precipitation data for the period August 1938 to July 1965 at Lakeport.

Temperature

The mean monthly temperature is 55° F. or higher for each of the five months, May through September. The mean for the coldest month is about 21° at Lakeport and probably less than 20° at the higher elevations. The mean July temperature is 70° or a little lower for much of the county. In an average summer the temperature reaches 90° on 10 days or less. The frequency varies from only a few days or none in an occasional cool summer to many more days than average in the warmer summers. Nights are almost always cool, even in the warmest summers.

Table 12 does not include the extreme high and low temperatures of record, but rather the temperature levels for a certain probability of occurrence. For planning purposes, these probabilities are more useful than the extremes. Furthermore, the temperatures that can be expected to occur on at least 4 days a month 2 years in 10 are nearly the same as the average monthly extreme temperatures. Therefore, they can be used as estimates of the extremes to be expected for a given month. For example, in July the maximum temperature will be 92° F. or higher, and the minimum will be 50° or lower on at least 4 days 2 years in 10. If the July extremes are averaged for the 26 years of record, the results are also the same; that is, 92° maximum and 50° minimum.

Table 13 shows the average frequency of specified temperatures by months, as well as the heating degree-days and growing degree-days. Degree-days are computed by recording each day the average departure from a selected temperature base and then summarizing these departures for the month, the season, or the year. The temperature selected as a base and the departures to be recorded depend upon the purpose. A base of 65° F. is used for heating degree-days, as this is the lowest daily average temperature for which no heat is required for homes. To get the departures for one day, the actual average temperature, if less than 65°, is subtracted from 65°. For example, a day averaging 55° has 10 heating degree-days. In contrast, a day averaging 65° or higher has no heating degree-days because no heat is required. Heating degree-days are useful in calculating the amount of fuel needed in an average year and in comparing a particular season with the average. They are used by gas, electric, and fuel companies in estimating fuel and power requirements and in scheduling fuel delivery.

[6] This section was prepared by ROBERT E. LAUTZENHEISER, State climatologist, Environmental Science Service Administration, Weather Bureau, Boston, Mass.

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TABLE 12.—*Temperature and precipitation*

[Lakeport, New Hampshire; elevation, 560 feet]

Month	Temperature					Precipitation						
	Average daily—			Two years in 10 will have at least 4 days with—		Average monthly total	One year in 10 will have—		Average monthly snowfall	Days with—		
	Maximum	Minimum	Mean	Maximum temperature equal to or higher than—	Minimum temperature equal to or lower than—		Less than	More than		Snowfall 1 inch or more	Snow cover 1 inch or more	Precipitation 0.10 inch or more
	°F.	°F.	°F.	°F.	°F.	Inches	Inches	Inches	Inches			
January	29.7	11.6	20.7	44	−7	3.07	1.3	4.6	21.2	6	29	7
February	32.5	12.4	22.5	46	−9	2.55	1.5	3.9	18.7	5	28	6
March	41.2	21.9	31.6	57	5	3.26	1.5	5.0	17.7	4	24	7
April	54.7	32.9	43.8	76	23	3.19	1.6	4.8	4.1	1	5	7
May	67.9	44.0	56.0	84	33	3.78	1.8	7.1	.4	(1)	(1)	8
June	76.7	53.9	65.3	91	44	3.56	1.5	6.2	0	0	0	7
July	81.6	59.3	70.5	92	50	3.63	2.1	6.0	0	0	0	7
August	79.2	57.6	68.4	92	47	3.18	1.3	6.4	0	0	0	6
September	71.0	50.1	60.6	87	39	3.91	1.2	8.0	0	0	0	6
October	60.4	40.3	50.4	76	29	3.17	1.3	5.8	.1	(1)	(1)	6
November	46.4	30.9	38.7	62	19	4.44	2.1	6.6	4.9	2	3	7
December	33.0	17.6	25.3	51	−1	3.28	1.1	5.5	14.6	4	17	6
Year	56.2	36.0	46.1	[2] 94	[3] −14	41.02	34.1	49.3	81.7	22	106	80

[1] Less than 0.5 day. [2] Average annual maximum. [3] Average annual minimum.

TABLE 13.—*Frequencies of selected temperature levels and averages of heating degree-days and growing degree-days*

[Lakeport, New Hampshire]

Month	Mean number of days with—				Accumulated heat units (degree-days)		
	Maximum temperature of—		Minimum temperature of—		Heating	Growing	
	90°F. or higher	32°F. or lower	32°F. or lower	0°F. or lower	Base 65°F.	Base 40°F.	Base 50°F.
	Days	Days	Days	Days	Degree-days	Degree-days	Degree-days
January	0	19	30	6	1,370	0	0
February	0	13	28	4	1,190	0	0
March	0	6	28	1	1,030	45	0
April	(1)	(1)	15	0	625	165	30
May	(1)	0	2	0	285	495	210
June	2	0	0	0	60	765	460
July	4	0	0	0	5	950	645
August	3	0	0	0	30	890	580
September	(1)	0	(1)	0	155	620	325
October	0	0	5	0	450	320	80
November	0	2	18	0	785	75	5
December	0	14	29	2	1,210	0	0
Year	9	54	155	13	7,195	4,325	2,335

[1] Less than 0.5 day.

Knowledge of growing degree-days is useful in planning when to plant and harvest crops. Growing degree-days accumulate when the average temperature is higher than the lowest temperature at which plants continue to grow. They are calculated by subtracting this base temperature from the actual average for the day. Data in table 13 are calculated for two standard bases: 40° F., for cool-weather crops, such as grasses, potatoes, and peas; and 50° for warm-weather crops, such as tomatoes and corn. Thus, a day that has an average temperature of 60° has 20 growing degree-days for cool-weather crops but only 10 for warm-weather crops.

A substantial number of growing degree-days in a given month does not necessarily indicate that it is safe to plant sensitive crops. A damaging freeze is possible. Table 14 gives the probability of freezing temperatures after specified dates in spring and before specified dates in fall. Sensitive plants may be seriously damaged if the temperature falls to 32°F., but hardier ones can withstand even lower temperatures.

TABLE 14.—*Probabilities of freezing temperatures in spring and fall*

[Lakeport, New Hampshire]

Probability	Dates for given probability and temperature				
	32° F. or lower	28° F. or lower	24° F. or lower	20° F. or lower	16° F. or lower
Spring:					
1 year in 10 later than	May 21	May 5	April 21	April 12	April 5
2 years in 10 later than	May 16	April 30	April 16	April 7	March 31
5 years in 10 later than	May 8	April 22	April 8	March 30	March 23
8 years in 10 later than	April 30	April 14	March 31	March 22	March 15
Fall:					
1 year in 10 earlier than	September 27	October 10	October 26	November 7	November 17
2 years in 10 earlier than	October 2	October 15	October 31	November 12	November 22
5 years in 10 earlier than	October 10	October 23	November 7	November 20	November 30
8 years in 10 earlier than	October 18	October 31	November 15	November 28	December 8

Around Lakeport, the average length of the freeze-free season is 155 days. This is representative of the urban location and probably of many protected locations within the county. An average season of between 130 and 140 days is more likely for most of the farming areas, and the season is even shorter for areas that are most frost prone.

In order to obtain approximate dates for various temperature levels for cropland areas, the Lakeport data in table 14 must be adjusted. In general, adding about 10 days to the last spring date and subtracting 10 days from the first fall date will give usable values. For protected areas, little or no adjustment should be made; for localities most susceptible to frost, a greater adjustment should be made.

Freeze occurrences depend considerably on local topography, on the nature of the soil, and on vegetative cover. Other factors being equal, plants in soil completely covered with vegetation will freeze earlier than plants in cultivated soil. Plants in peaty soil, which has little capacity to transfer heat from lower levels, will freeze earlier than plants in sandy soil, which has a much greater coefficient of heat conductivity.

Vegetation-covered, boggy depressions, especially at higher elevations are highly susceptible to frost on clear, windless nights, because they catch and hold surface air cooled to freezing temperature by radiation. In such areas, commonly known as frost pockets, frost may occur late in spring, early in fall, or even in an occasional midsummer.

Subfreezing air from farther north, generally accompanied by strong winds, causes what is called a black freeze, which kills plants and turns their color without depositing white frost. A freeze of this type is always most severe at the highest elevations.

Precipitation

The average annual precipitation for the county, including the water equivalent of the snowfall, is about 41 inches. The average for the higher elevations is probably 44 or 45 inches, but no supporting records are available. Precipitation is distributed evenly among the seasons. Slightly more than half falls during the warmer 6 months. The total is enough to provide adequate water for homes and industries and for irrigation of crops during the short but fairly common dry spells.

Table 12 shows monthly averages of precipitation as well as the minimum and maximum monthly amounts to be expected 1 year in 10. For example, in 1 year in 10 there will be less than 1.5 inches of rain in June, and in 1 year in 10, more than 6.2 inches. An extremely dry month is rare, but 2 or more dry months may occur consecutively. Such occurrences during the growing season may be detrimental to crops. The period April through July is the most critical. In 1 year in 10, the total rainfall for 2 consecutive months during this period is less than 3.5 inches, or not quite 50 percent of normal for 2 months. Also in 1 year in 10, the total for these 4 months is less than 9.4 inches, or about 65 percent of normal.

Snowfall varies considerably from one winter to another. It may also vary from place to place in the same season. The average seasonal snowfall is between 70 and 75 inches in much of the eastern part of the county and at the lower elevations; it is between 75 and 85 inches in most of the western part and at the higher elevations. Seasonal totals vary from about 50 percent of average to about 150 percent.

Snow cover is continuous for at least 1 month a year. At Lakeport the average duration is 104 days, and the extremes range from 49 to 127 days. In towns and open fields, the average maximum depth per season is 2 to 2½ feet, and at higher elevations, the cover is deeper. The date of the maximum snow depth is about February 20 at the weather stations. In more heavily wooded areas, the maximum depth is reached later in the season. The maximum snow depth ranges from 10 inches to as much as 5 feet.

At Lakeport the seasonal occurrences of snowfall of specified amounts per day are as follows: 4 inches or more on 2 to 11 days per season, and an average of 6 days; 8 inches or more on 0 to 4 days per season, and an average of 1 day; 10 inches or more on 0 to 3 days per season, an average of 1 in 2 seasons, and multiple occurrences 1 season in 8.

Evaporation

Evaporation is determined by measuring the evaporation from a standard open pan. The average evaporation

from a lake in this area is considered to be about 77 percent of that from a pan. Available monthly averages of total evaporation are as follows: 9-year average for May, 5.10 inches; 11-year average for June, 5.83 inches; 14-year averages for July, August, and September, 6.25, 5.31, and 3.63 inches, respectively; and 6-year average for October, 2.57 inches.

Storms

Thunderstorms occur on an average of 20 to 25 days a year, though the number varies considerably. Most of these storms do little damage; instead, they bring beneficial rain. Spring and summer thunderstorms are accompanied by hail about once or twice a year at any given location, but the stones seldom damage crops extensively. Some local damage may be severe.

Hurricanes affect Belknap County only once in more than 10 years. Coastal storms, or "northeasters," are more frequent but usually do not cause serious damage this far inland. Tornadoes have struck in Belknap County but are not common, and they usually affect only a small area. Personal injuries and significant property damage are rare, yet the danger should not be minimized.

Additional Facts About the County

The county is drained by the Pemigewasset, Suncook, and Winnipesaukee Rivers. It has about 43,000 acres of water and about 315 miles of pond and lake frontage. Winnipesaukee, Winnisquam, Squam, and Suncook are the larger lakes, and around these most of the recreational activities are centered. In general, the water supply is adequate for domestic and industrial use.

In 1960, the total population was 28,912. Of the 11,256 people in the labor force, 4,239 were employed in manufacturing, 338 in agriculture, and the rest in communications, utilities, retail and wholesale trade, real estate, and other kinds of business. Machinery manufacturing is the major industry; others are textile, furniture, lumber, and wood industries.

Interstate Route 93 extends north and south through the western part of the county, and U.S. Route 3 through the central part. In addition there are a number of State and county routes. Rail and air service are limited.

Farms are increasing in size and decreasing in number. In 1954 there were 575 farms in Belknap County. By 1959 there were only 359 farms, and by 1964, only 266.

The average size of farms increased from 137.1 acres in 1954 to 174.6 acres in 1959, and to 186.9 acres in 1964. Dairying brings the greatest farm income, followed by poultry, fruit, and other farming enterprises. Listed below is the number of the major types of farms in 1959 and 1964.

Type	*Number 1959*	*1964*
Dairy	82	50
Fruit	15	16
Livestock other than dairy and poultry	11	10
Poultry	30	18
Miscellaneous and unclassified	191	159

The acreage of principal crops in 1959 and 1964 was as follows:

	1959 acres	*1964 acres*
Corn for all purposes	314	332
All hay	9,241	7,832
Alfalfa	623	617
Clover and timothy, alone or mixed	5,555	3,699
Oats and other small grains cut for hay	148	33
Other hay	2,654	3,295
Silage from grass or hay crops	261	188
Sweet corn	193	42
Blueberries (tame or wild)	526	479
Apple trees of bearing age (number)	15,381	8,436

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Glossary

Acidity. See Reaction, soil.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well-aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster, such as a clod, crumb, block, or prism.

Alluvial soil. Soil forming in recently deposited material and showing little modification of the original material.

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Available moisture capacity. The difference between the amount of water in a soil at field capacity and the amount in the same soil at the permanent wilting point. Commonly expressed as inches of water per inch of depth of soil and described as *low*, *moderate*, or *high*.

Base saturation. The degree to which a material is saturated with exchangeable cations other than hydrogen; expressed as a percentage of the cation-exchange capacity.

Bedding, land. Plowing, grading, or otherwise elevating the surface of a flat field into a series of broad beds, or "lands," so as to leave shallow surface drains between the beds.

Bleicherde. The light-colored, leached, A2 horizon of a Podzol.

Boulder (USDA classification). A stone more than 24 inches in diameter.

Catena. A sequence, or "chain," of soils on a landscape, developed from one kind of parent material but having different characteristics because of differences in relief and drainage.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Cobblestone. A rounded or partly rounded stone 3 to 10 inches in diameter.

Complex, soil. A mapping unit consisting of different kinds of soils that occur in such small individual areas or in such an intricate pattern that they cannot be shown separately on a publishable soil map.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent; will not hold together in a mass.

Friable.—When moist, crushes easily under gentle to moderate pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a wire when rolled between thumb and and forefinger.

Sticky.—When wet, adheres to other material; tends to stretch somewhat and pull apart, rather than pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

Contour farming. Plowing, cultivating, planting, and harvesting in rows that are at right angles to the natural direction of the slope or that are parallel to the terrace grade.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production; or a crop grown between trees and vines in orchards and vineyards.

Eluviation. The movement of material from one place to another within the soil, in either true solution or colloidal suspension. Soil horizons that have lost material through eluviation are said to be eluvial; those that have received material are illuvial.

Field terrace. See Terrace.

Fragipan. A dense, brittle, subsurface horizon very low in organic matter and clay but rich in silt or very fine sand. The layer seems to be cemented when dry, is hard or very hard, and has a high bulk density in comparison with the horizon above it. When moist, the fragipan tends to rupture suddenly if pressure is applied rather than to deform slowly. The layer is generally mottled, is slowly or very slowly permeable to water, and has a few to many bleached fracture planes that form polygons. Fragipans are a few inches to several feet thick and generally occur below the B horizon, 15 to 40 inches below the surface.

Gleization. The reduction, translocation, and segregation of soil compounds, notably of iron and generally in the subsoil or substratum, as a result of poor aeration and drainage; evident in the soil by mottled colors, dominantly gray. The soil-forming processes leading to the development of a gley soil.

Graded stripcropping. Growing crops in strips that are graded toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, and covered by grass for protection against erosion; used to conduct surface water away from cropland.

Gravel (USDA classification). Rounded or subrounded fragments of rock up to 3 inches in diameter.

Green-manure crop. A crop grown for the purpose of being turned under in an early stage of maturity, or soon after maturity, for soil improvement.

Horizon, soil. A layer of soil, approximately parallel to the soil surface, with characteristics produced by soil-forming processes. Horizons are identified by letters of the alphabet and may be subdivided.

O horizon. The layer of organic matter on the surface of a mineral soil. It consists of decaying plant residue.

A horizon. The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active, and it is therefore marked by the accumulation of humus. It may have lost soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizon. The mineral horizon below an A horizon. The B horizon is, in part, a layer of change from the overlying A to the underlying C horizon. The B horizon also has (1) distinctive characteristics caused by accumulation of clay, sesquioxides, humus, or some combination of these; (2) prismatic or blocky structure; (3) redder or stronger colors than the A horizon; or (4) some combination of these. The combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon. The weathered rock material immediately beneath the solum. This layer, commonly called the soil parent material, is presumed to be like that from which the overlying horizons were formed in most soils. If the underlying material is different from that in the solum, a Roman numeral precedes the letter, C.

R layer. Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

Lithologic discontinuity. Changes in lithology from one of the master horizons. Such changes are identified by Roman numerals.

Gleyed horizon. A strongly mottled horizon that occurs in wet soils and is designated by g.

Fragipan horizon. A compact horizon designated by x.

Illuviation. The accumulation of material in a soil horizon through the deposition of suspended material and organic matter removed from horizons above. In many soils the B horizon is an illuvial horizon because part of its fine clay content has come from the A horizon above.

Inclusions. See Mapping unit, soil.

Internal soil drainage. The downward movement of water through the soil profile. The rate of movement is determined by the texture, structure, and other characteristics of the soil profile and underlying layers, and by the height of the water table, either permanent or perched. Terms for expressing internal drainage are *none*, *very slow*, *slow*, *medium*, *rapid*, and *very rapid*.

Leached layer. A layer from which the soluble materials have been dissolved and washed away by percolating water.

Mapping unit, soil. Areas of soil of the same kind outlined on the soil map and identified by a symbol. Any area outlined on the map may include soils or land types of other mapping units to the extent of 15 percent. These are called inclusions.

Mottling, soil. Contrasting color patches that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are: abundance—*few*, *common*, and *many*; size—*fine*, *medium*, and *coarse*; and contrast—*faint*, *distinct*, and *prominent*. The size measurements are: *fine*, less than 5 millimeters (about 0.2 inch) long; *medium*, 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) long; and *coarse*, more than 15 millimeters (about 0.6 inch) long.

Munsell color system. A system for designating color by hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with a hue of 10YR, a value of 6, and a chroma of 4.

Orterde. The aggregated, friable, noncemented B or subsurface horizon of Podzol soils. The accumulation of organic matter or organic matter and iron sesquioxide imparts the usual dark-brown or yellowish coloring.

Pan layer. See Fragipan.

Parent material. The horizon of weathered rock or partly weathered soil material from which soil has formed; horizon C in the soil profile.

Ped. An individual natural soil aggregate, such as a crumb, a prism, or a block, in contrast to a clod.

Perched water table. See Water table.

Permeability, soil. The quality of a soil that enables water or air to move through it. Terms and rates in inches per hour used to describe permeability are *very slow*—0.2, *slow*—0.2–.63, *moderate*—.63–2.0, *rapid*—2.0–6.3, and *very rapid*—6.3.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material. See Horizon, soil.

Reaction, soil. The degree of acidity or alkalinity of a soil expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction, because it is neither acid nor alkaline. In words the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Mildly alkaline	7.4 to 7.8
Very strongly acid	4.5 to 5.0	Moderately alkaline	7.9 to 8.4
Strongly acid	5.1 to 5.5	Strongly alkaline	8.5 to 9.0
Medium acid	5.6 to 6.0	Very strongly alkaline	9.1 and higher
Slightly acid	6.1 to 6.5		
Neutral	6.6 to 7.3		

Runoff. The part of the precipitation upon a drainage area that is discharged from the area in stream channels. The water that flows off the land surface without sinking in is called surface runoff; that which enters the ground before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand plains. Deposits of glacial outwash consisting mostly of sand-sized material.

Soil. A natural, three-dimensional body on the earth's surface that supports plants and has properties resulting from the integrated effect of climate and living matter acting upon parent material, as conditioned by relief, over periods of time.

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying parent material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum. In soils that have no B horizon, the A horizon alone is the solum.

Stone (USDA classification). A rock fragment larger than 10 inches in diameter, if rounded, or longer than 15 inches if flat.

Stripcropping. Growing crops in a systematic arrangement of strips that serve as vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are *platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are (1) *single grain* (each grain by itself, as in dune sand) or (2) *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the profile below plow depth.

Substratum. Any layer lying beneath the solum, or true soil; the C or R horizon.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness. The plowed layer.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. Terraces intercept surplus runoff so that it can soak into the soil or flow slowly to a prepared outlet without causing erosion. Terraces in fields are generally built so they can be farmed. Terraces intended mainly for drainage have a deep channel that is maintained in permanent sod.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportions of fine particles are as follows: *sand*, *loamy sand*, *sandy loam*, *loam*, *silt loam*, *silt*, *sandy clay loam*, *clay loam*, *silty clay loam*, *sandy clay*, *silty clay*, and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine." In general terms, coarse-textured soils are sand and loamy sand; medium-textured soils are very fine sandy loam, loam, silt loam, and silt; fine-textured soils are sandy clay, silty clay, and clay.

Tilth. The condition of the soil in relation to the growth of plants, especially soil structure. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable, granular structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Water table. The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone.

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U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

NEW HAMPSHIRE AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP
BELKNAP COUNTY, NEW HAMPSHIRE

SCALE IN MILES
1 0 1 2 3 4

N

SOIL ASSOCIATIONS

1 — Windsor-Hinckley-Au Gres association: Deep, excessively drained and poorly drained, coarse-textured soils that formed in sand and gravel in stream valleys

2 — Gloucester-Shapleigh-Whitman association: Deep and shallow, somewhat excessively drained, moderately coarse textured soils on gently sloping to steep uplands and very poorly drained, very stony soils in upland depressions

3 — Shapleigh-Gloucester association: Shallow and deep, somewhat excessively drained, moderately coarse textured soils on mountains and islands

4 — Paxton-Shapleigh-Woodbridge association: Deep and shallow, dominantly well drained, medium-textured and moderately coarse textured soils on hilly uplands

5 — Gloucester-Paxton-Shapleigh association: Deep and shallow, well-drained and somewhat excessively drained, moderately coarse textured and medium-textured soils on rolling uplands

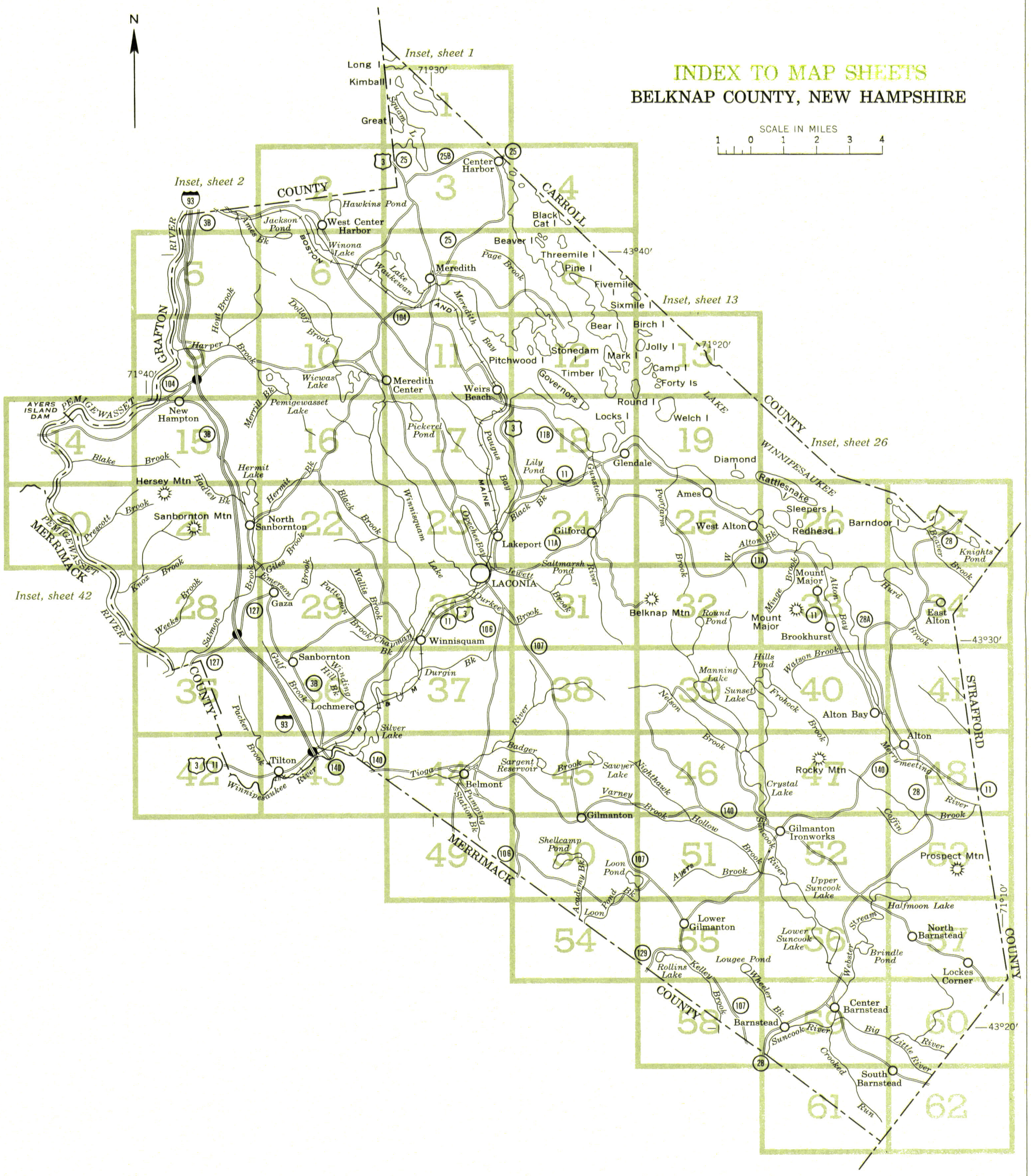
September 1967

INDEX TO MAP SHEETS

BELKNAP COUNTY, NEW HAMPSHIRE

SCALE IN MILES

1 0 1 2 3 4



This map is one of a set compiled in 1966 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the New Hampshire Agricultural Experiment Station.
BELKNAP COUNTY, NEW HAMPSHIRE NO. 1

(Joins inset)

(Joins upper left)

(Joins sheet 3)

Scale 1:15840

0 ½ 1 Mile

0 5,000 Feet

N

1

N

(Joins sheet 6)

(Joins sheet 9)

(Joins sheet 11)

(Joins sheet 16)

NEW HAMPTON

MEREDITH

Harper Hill

Dolloff Brook

Forest Pond

PEMIGEWASSET LAKE

WICWAS LAKE

Meredith Center

OAKLAND CEMETERY

Scale 1:15840

0 ½ 1 Mile

0 5000 Feet

This map is one of a set compiled in 1966 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the New Hampshire Agricultural Experiment Station.
BELKNAP COUNTY, NEW HAMPSHIRE NO. 11

(Joins sheet 7)
(Joins sheet 10)
(Joins sheet 12)
(Joins sheet 17)

MEREDITH

MEREDITH BAY

LACONIA

Meredith Center

Pinnacle Hill

Maiden Lady Cove

Doe Point

Weirs Beach

Scale 1:15840

0 ½ 1 Mile

0 5000 Feet

N

(Joins sheet 8)

(Joins sheet 11)

(Joins sheet 13)

(Joins sheet 18)

N

Fish Cove

Meredith

Boardmans Point

Hen Island

Salys Gut

Oak Island

Stonedam Island

Spindle Point

Pitchwood Island

MEREDITH NECK

Black Cove

Horse Island

Dolly Island

Penny Island

Bear

St Johns Church

Dollar Island

Shore

Mark Island

Mink Island

Eagle Island

LAKE WINNIPESAUKEE

GILFORD

Timber Island

Round Island

Governors Island

Hoits Point

Pendleton Beach

LACONIA

Scale 1: 15840

0 ½ 1 Mile

0 5,000 Feet

(Joins inset)

(Joins sheet 12)

M E R E D I T H

L A K E

W I N N I P E S A U K E E

G I L F O R D

A L T O N

CARROLL COUNTY

Birch Island
GsD

GsD

Steamboat Island

SoD
AtB
Jolly Island

Little Camp Island
ShC
AtB

W

SoD
Camp Island
AtB

AtB
Breezy Island

AtB
Forty Islands

RdA
Duds Island

AtB
Fish Island

Round Island
SoD

N

(Joins sheet 8)

LAKE WINNIPESAUKEE

CARROLL COUNTY

Sixmile Island
SoD

Ro
Little Sixmile Island
Ro

M E R E D I T H

(Joins upper left)

(Joins sheet 19)

0 ½ 1 Mile

Scale 1:15840

0 5000 Feet

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BELKNAP COUNTY, NEW HAMPSHIRE NO. 13

N

AYERS ISLAND DAM

PEMIGEWASSET RIVER

GRAFTON COUNTY

GRAFTON COUNTY

Blake Brook

White Oak Hill

NEW HAMPTON

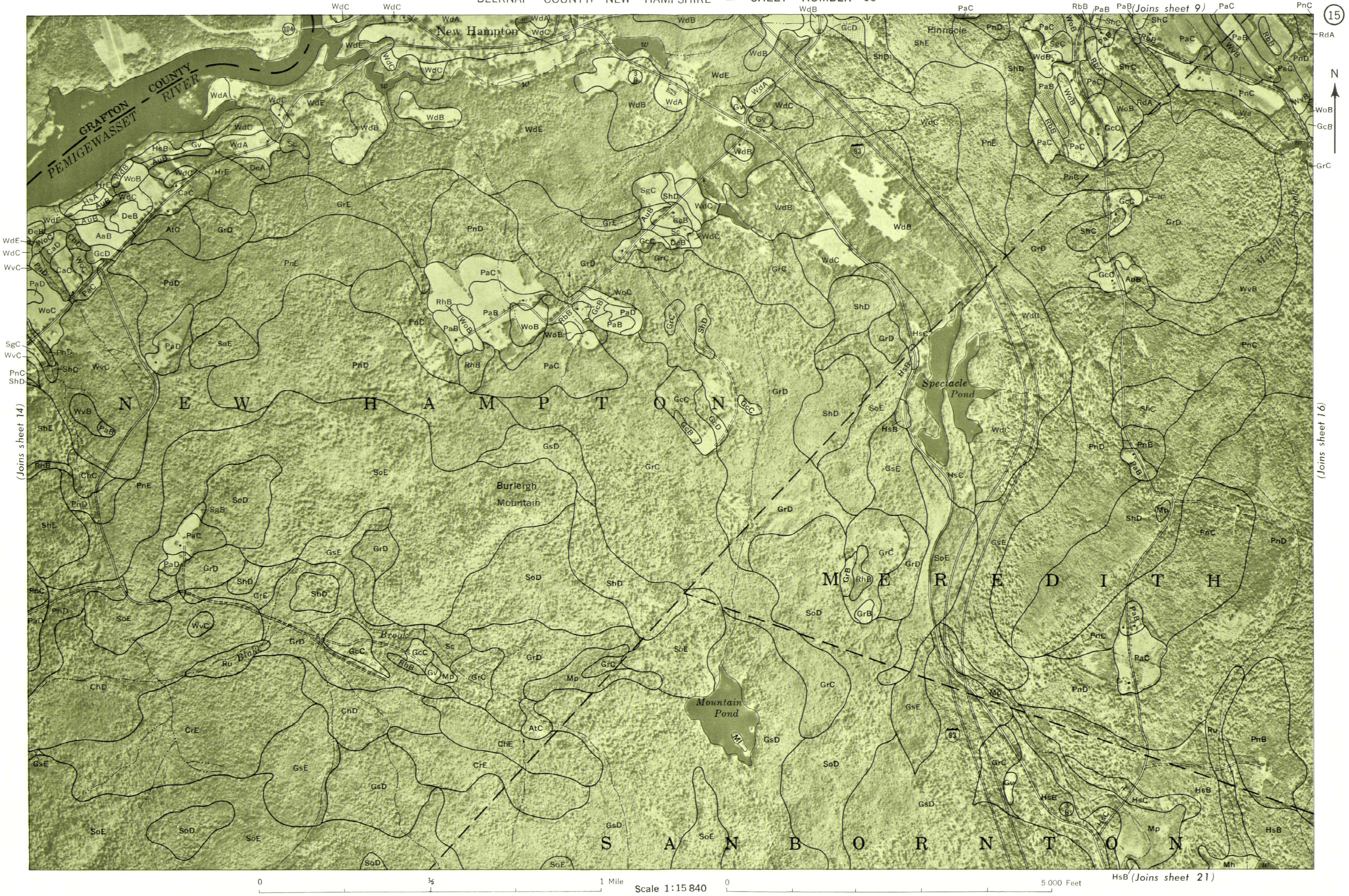
(Joins sheet 15)

(Joins sheet 20)

0 ½ 1 Mile

Scale 1:15840

0 5,000 Feet



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16

N

(Joins sheet 10)

(Joins sheet 15)

(Joins sheet 17)

(Joins sheet 22)

M E R E D I T H

LACONIA

WINNISQUAM LAKE

WICWAS LAKE

Mud Pond

Swains Pond

Loon Island

Saddle Hill

Meredith Hill

Leavitt Mountain

Ladd Mountain

Randlett Pond

Bridge

Hemlock

SANBORNTON

Scale 1:15840

0 ½ 1 Mile

0 5000 Feet

BELKNAP COUNTY, NEW HAMPSHIRE NO. 16

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BELKNAP COUNTY, NEW HAMPSHIRE NO. 17

(Joins sheet 16)

(Joins sheet 11)

(Joins sheet 18)

(Joins sheet 23)

MEREDITH

LACONIA

WINNISQUAM LAKE

Pickerel Pond

Moultons Cove

Pickerel Cove

PAUGUS BAY

Three Islands

Quinby Point

Plummer Point

Plummer Island

Big Island

OLD TOWN CEMETERY

BOSTON & MAINE

0 ½ 1 Mile

Scale 1:15 840

0 5000 Feet

N

18

N

(Joins sheet 12)

(Joins sheet 17)

(Joins sheet 19)

(Joins sheet 24)

LAKE WINNIPESAUKEE

Interlaken Park

St. Helena Church

Riley Pt.

Governors Island

Timber Island

Round Island

Dockham Shore

Locks Island

Rock Island

Varney Point

Pig Island

Belknap Point

Cove

Sanders Bay

Smith

Glendale

LACONIA

GILFORD

Brook

Gunnatock

Meadow

River

LACONIA AIRPORT

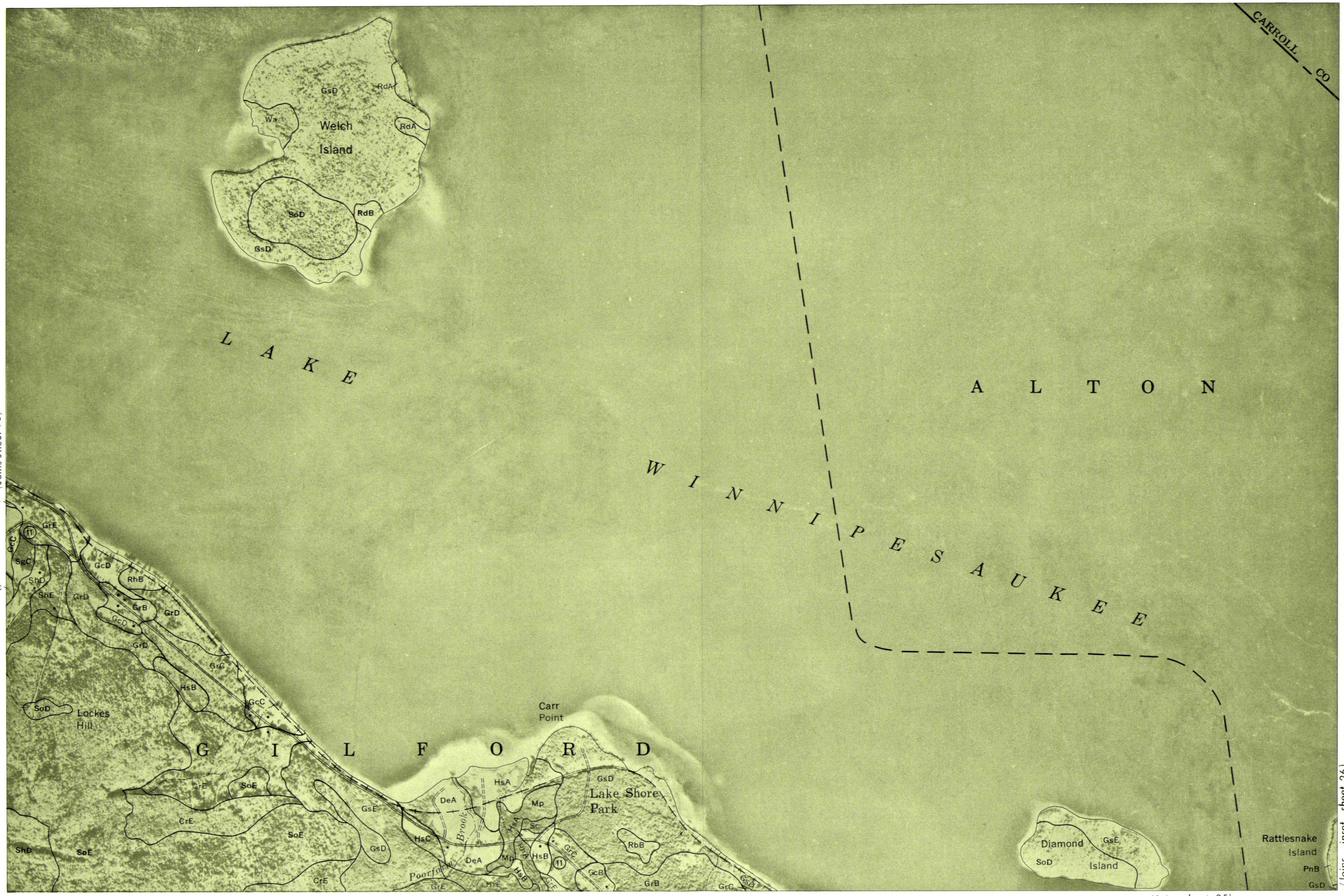
Lily Pond

PAUGUS BAY

0 ½ 1 Mile

Scale 1:15840

0 5000 Feet



0 ½ 1 Mile Scale 1:15840 0 5000 Feet

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BELKNAP COUNTY, NEW HAMPSHIRE NO. 19

N

GRAFTON COUNTY

PEMIGEWASSET RIVER

Squam River

SCRIBNER FELLOWS STATE FOREST

BOSTON AND MAINE

Ames Brook

NEWHAMPTON

CENTER HARBOR

Hawkins Pond

Winona Lake

Bear Pond

West Center Harbor

McGillis Hill

(Joins lower left)

(Joins sheet 5)

(Joins sheet 3)

(Joins inset)

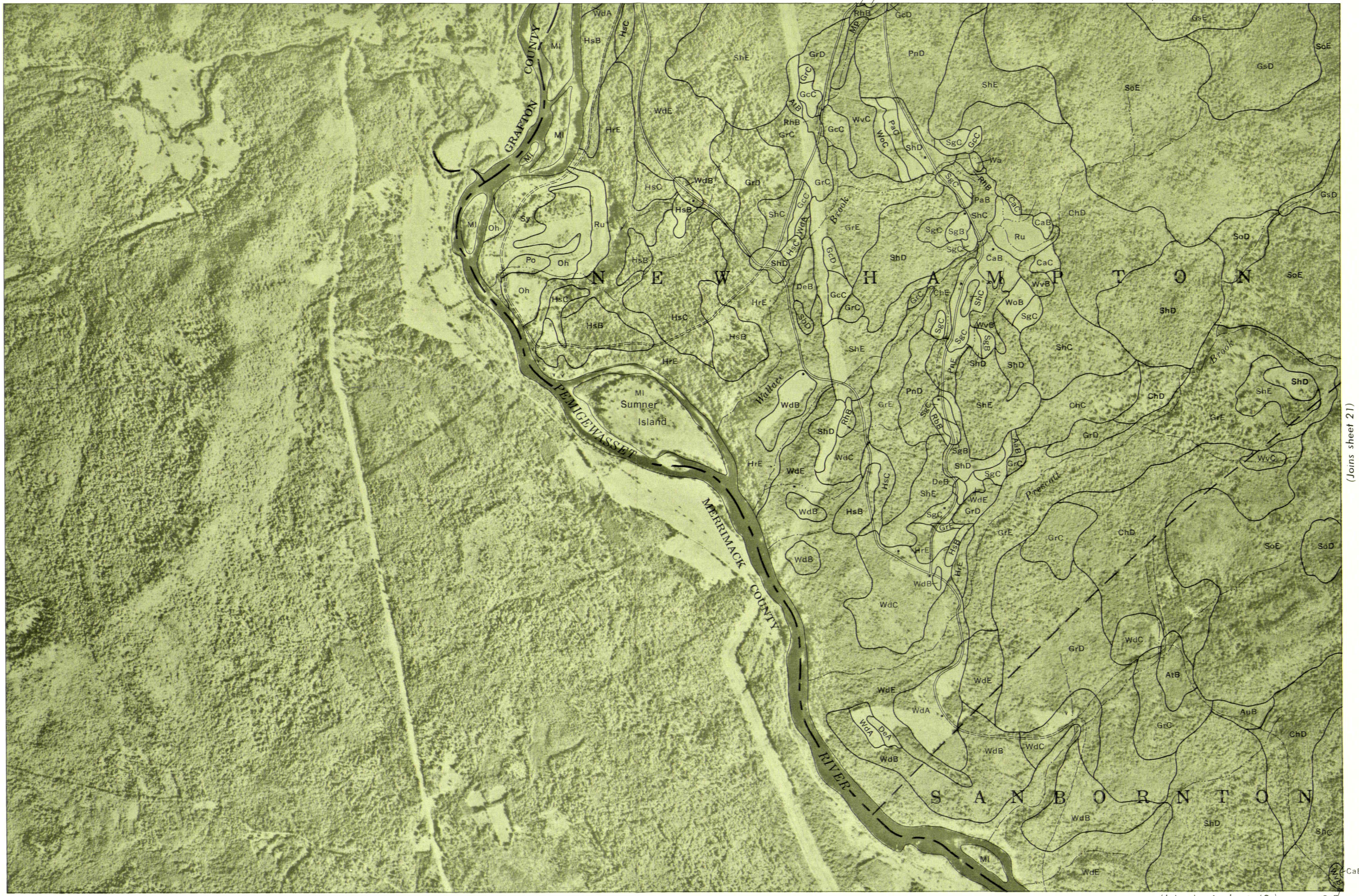
(Joins sheet 6)

HsB ChD

0 ½ 1 Mile

Scale 1:15840

0 5000 Feet



0 ½ 1 Mile Scale 1:15 840 0 5 000 Feet

(Joins sheet 15)
(Joins sheet 20)
(Joins sheet 22)
(Joins sheet 28)

21

N

NEW HAMPTON

SANBORNTON

Hersey Mountain

Sanbornton Mountain

North Sanbornton

Prescott Brook

Hadley Brook

Eaton Brook

Hermit Lake

Hermit Brook

Canley Pond

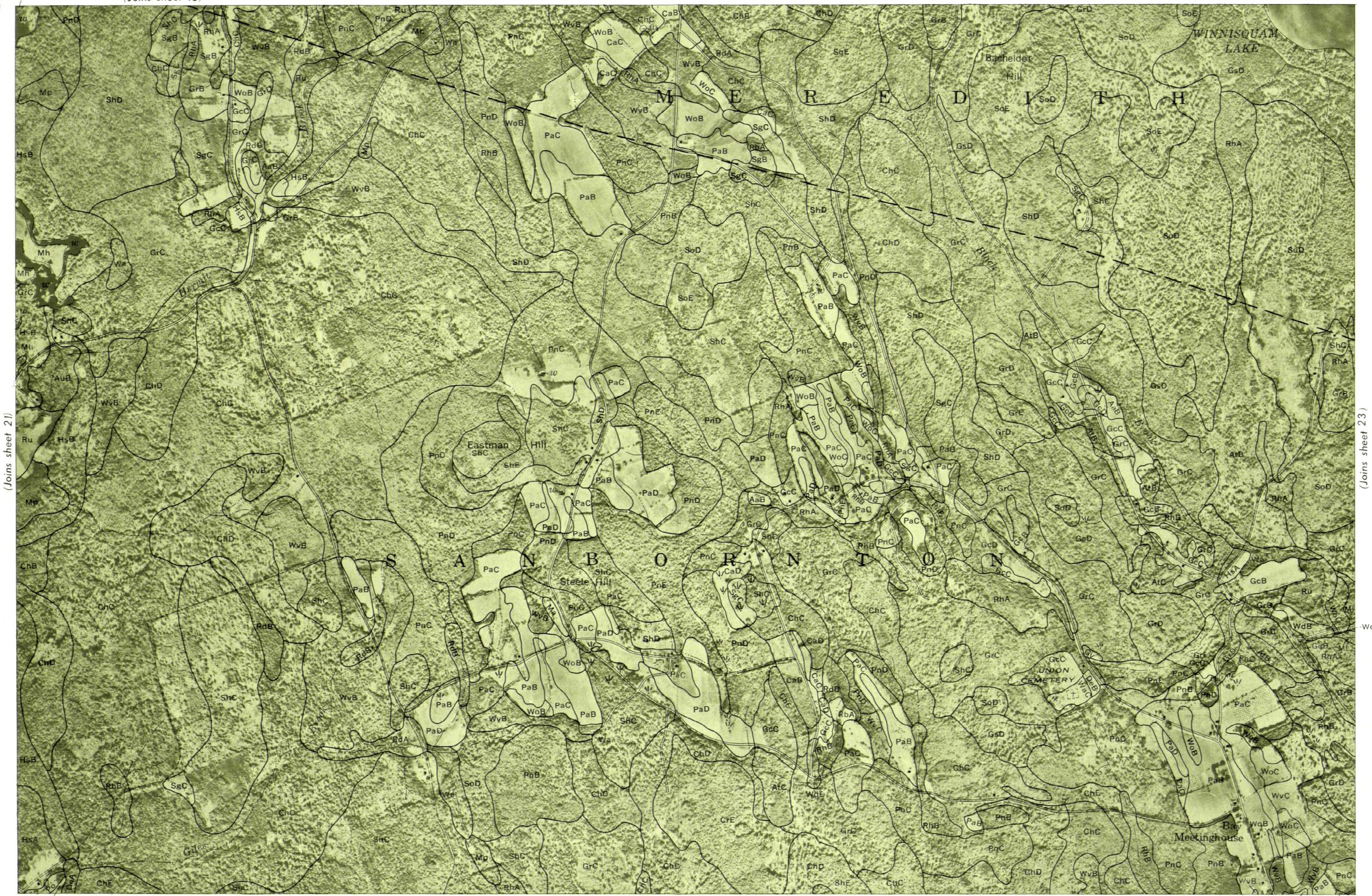
SoD SoE GsD GrC GrD RhA RhB Mh Mp ShD ShE HsB HsC WdB ChC ChD WvB CaB AuB AtB RdA RdB SgC Wa ShC Ru HsA AaB GcC

0 ½ 1 Mile

Scale 1:15840

0 5000 Feet

N



0 ½ 1 Mile

Scale 1:15840

0 5000 Feet

(Joins sheet 17)

(Joins sheet 22)

(Joins sheet 24)

(Joins sheet 30)

MEREDITH

WINNISQUAM LAKE

SANBORNTON

PAUGUS BAY

OPECHEE BAY

LACONIA

Little Island

Cass Point

Lakeport

Pot Island

Black Island

Perley Pond

LACONIA STATE SCHOOL

SOUND BAY CEMETERY

BOSTON AND MAINE

GILFORD

N

0 1 Mile

Scale 1:15840

0 5000 Feet

N

(Joins sheet 18)

(Joins sheet 23)

(Joins sheet 25)

(Joins sheet 31)

PAUGUS BAY

LACONIA

LACONIA AIRPORT

Lily Pond

Meadow Brook

Black Brook

Brooks

BAYSIDE CEMETERY

MC COY CEMETERY

PINEGROVE CEMETERY

Gunstock River

Gilford

GILFORD

BELKNAP MOUNTAINS

0 ½ 1 Mile

Scale 1:15 840

0 5000 Feet

(Joins sheet 19)
(Joins sheet 24)
(Joins sheet 26)
(Joins sheet 32)

25

N

LAKE WINNIPESAUKEE

Blaisdell Point
Coleman Point
Sleepers Point
Spring Haven
Ames
West Alton

BELKNAP MOUNTAINS
Mount Rowe
GILFORD
ALTON

Pout Brook
Ames Brook
Alton Brook

0 ½ 1 Mile
Scale 1: 15840
0 5000 Feet

26

N

(Joins inset)

CARROLL COUNTY

LAKE WINNIPESAUKEE

Rattlesnake Island

GsD Ro SoE

Smith Point

Sleepers Island

Redhead Island

HrE

Gilidden Cove

Smalls Cove

Minge Cove

Minge Brook

Rum Point

ALTON

West Alton

Swasey Brook

(Joins sheet 25)

(Joins sheet 27)

(Joins sheet 33)

(Joins sheet 19)

(Joins upper left)

PnB

GsE GrD HsB HrE Sc Mp HsA Ro Mp Rm Sc Ru RhA Gv GcB ShE GrC SoD

0 ½ 1 Mile

Scale 1:15840

0 5000 Feet

27

N

Little Barndoor Island

Barndoor Island

Clay Point

Roberts Cove

Knights Pond

Rines Hill

Beaver Brook

LAKE WINNIPESAUKEE

ALTON

CARROLL COUNTY

STRAFFORD COUNTY

(Joins sheet 26)

(Joins sheet 34)

Scale 1:15840

0 ½ 1 Mile

0 5,000 Feet

(Joins sheet 21)

N

SANBORNTON

Rollins Pond

Brook

Knox

Weeks

Salmon

Brook

PEMIGEWASSET RIVER

MERRIMACK COUNTY

CROCKETT CEMETERY

(Joins inset, sheet 42)

(Joins sheet 29)

(Joins sheet 35)

0 ½ 1 Mile Scale 1:15840 0 5000 Feet

BELKNAP COUNTY, NEW HAMPSHIRE NO. 28

BELKNAP COUNTY, NEW HAMPSHIRE NO. 29

(Joins sheet 28)

(Joins sheet 22)

(Joins sheet 30)

(Joins sheet 36)

N

Hopkinson Hill

Rollins Pond

Sidney Brook

Gaza

Brook

SANBORNTON

Hunkins Pond

Scale 1:15 840

0 ½ 1 Mile

0 5 000 Feet

BELKNAP COUNTY, NEW HAMPSHIRE — SHEET NUMBER 3

3

N

(Joins sheet 1)

(Joins sheet 2)

(Joins sheet 4)

(Joins sheet 7)

CARROLL COUNTY

GRAFTON COUNTY

LAKE WINNIPESAUKEE

Dog Cove

Center Harbor

Halfmile Island

Sunset Hill

Gilman Hill

C E N T E R H A R B O R

M E R E D I T H

Smith Brook

0 ½ 1 Mile

Scale 1: 15840

0 5000 Feet

This map is one of a set compiled in 1966 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the New Hampshire Agricultural Experiment Station.

BELKNAP COUNTY, NEW HAMPSHIRE NO. 3

30

N

(Joins sheet 23)

(Joins sheet 29)

(Joins sheet 31)

(Joins sheet 37)

SANBORNTON

LAKE WINNISQUAM

BELMONT

TILTON

LACONIA

Hog Island

Ladd Hill

Winnisquam

Durkee Brook

Chapman Brook

Jewett Brook

MAINE AND BOSTON

UNION CEMETERY

ST LAMBERTS CEMETERY

0 ½ 1 Mile

Scale 1:15840

0 5000 Feet

This map is one of a set compiled in 1966 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the New Hampshire Agricultural Experiment Station.

(Joins sheet 30)

(Joins sheet 24)

(Joins sheet 32)

(Joins sheet 38)

N

Saltmarsh Pond

LACONIA

GILFORD

BELMONT

BELKNAP STATE RESERVATION

Gunstock Mountain

Piper Mountain

Scale 1: 15 840

0 ½ 1 Mile

0 5000 Feet

32

(Joins sheet 25)

N

(Joins sheet 31)

(Joins sheet 33)

(Joins sheet 39)

Gunstock Mountain

BELKNAP MOUNTAIN STATE RESERVATION

Belknap Mountain

Piper Mountain

Round Pond

GILFORD

BELKNAP MOUNTAINS

ALTON

GILMANTON

0 ½ 1 Mile

Scale 1:15 840

0 5 000 Feet

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

This map is one of a set compiled in 1956 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the New Hampshire Agricultural Experiment Station.

BELKNAP COUNTY, NEW HAMPSHIRE NO. 33

34

N

(Joins sheet 27)

(Joins sheet 33)

(Joins sheet 41)

ALTON

Roberts Cove

Hardhead Hill

Hurd Brook

Evans Hill

Brook

Gilman Pond

East Alton

Cates Hill

Hayes Hill

Blaney Brook

STRAFFORD COUNTY

28

28A

SoD SoE GsD GsE GrC GrB GrD GrE PnB PnC PnD PnE PaB RhA RhB WvB AtB AtC ShC ShE RdB HrE WdB WdC Sc HsC Mp Mh GcB GcC

0 ½ 1 Mile

Scale 1: 15840

0 5000 Feet

BELKNAP COUNTY, NEW HAMPSHIRE NO. 34

(Joins sheet 28)

35

N

SANBORNTON

TILTON

PEMIGEWASSET RIVER

MERRIMACK COUNTY

Giles Pond

Salmon Brook

Threshing Mill Brook

Tucker Brook

Calef Hill

(Joins sheet 36)

(Joins sheet 42)

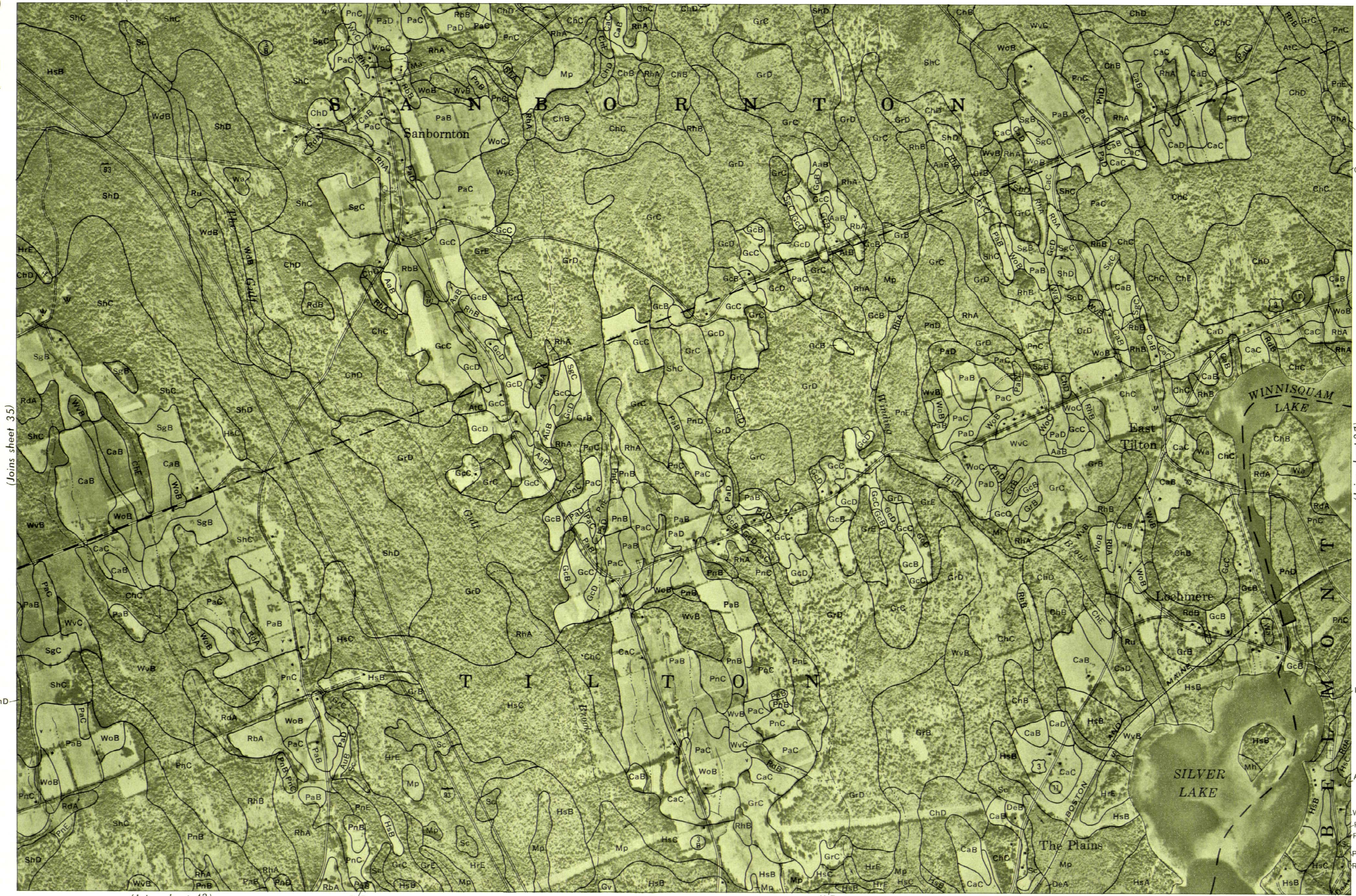
0 ½ 1 Mile

Scale 1:15840

0 5,000 Feet

This map is one of a set compiled in 1966 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the New Hampshire Agricultural Experiment Station.

BELKNAP COUNTY, NEW HAMPSHIRE NO. 35



0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

This map is one of a set compiled in 1966 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the New Hampshire Agricultural Experiment Station.
BELKNAP COUNTY, NEW HAMPSHIRE NO. 37

(Joins sheet 30)
(Joins sheet 36)
(Joins sheet 38)
(Joins sheet 44)

TILTON
BELMONT
LAKE WINNISQUAM
Mohawk Island
Boston and Maine
Brook
Burnham

Scale 1:15 840
0 ½ 1 Mile
0 5 000 Feet

N

(Joins sheet 31)

N

G I L F O R D

B E L M O N T

G I L M A N T O N

Whiteface Mountain

Lamprey Hill

Grant Hill

Tioga River

River

(Joins sheet 37)

(Joins sheet 39)

(Joins sheet 45)

0 ½ 1 Mile

Scale 1:15840

0 5000 Feet

(Joins sheet 32)

39

N

(Joins sheet 38)

(Joins sheet 40)

(Joins sheet 46)

GILFORD

GILMANTON

ALTON

Camp Leo

Goat Pasture Hill

Manning Lake

Round Pond

Hills Pond

Sunset Lake

Nelson Brook

Gunnea Brook

Scale 1:15 840

0 ½ 1 Mile

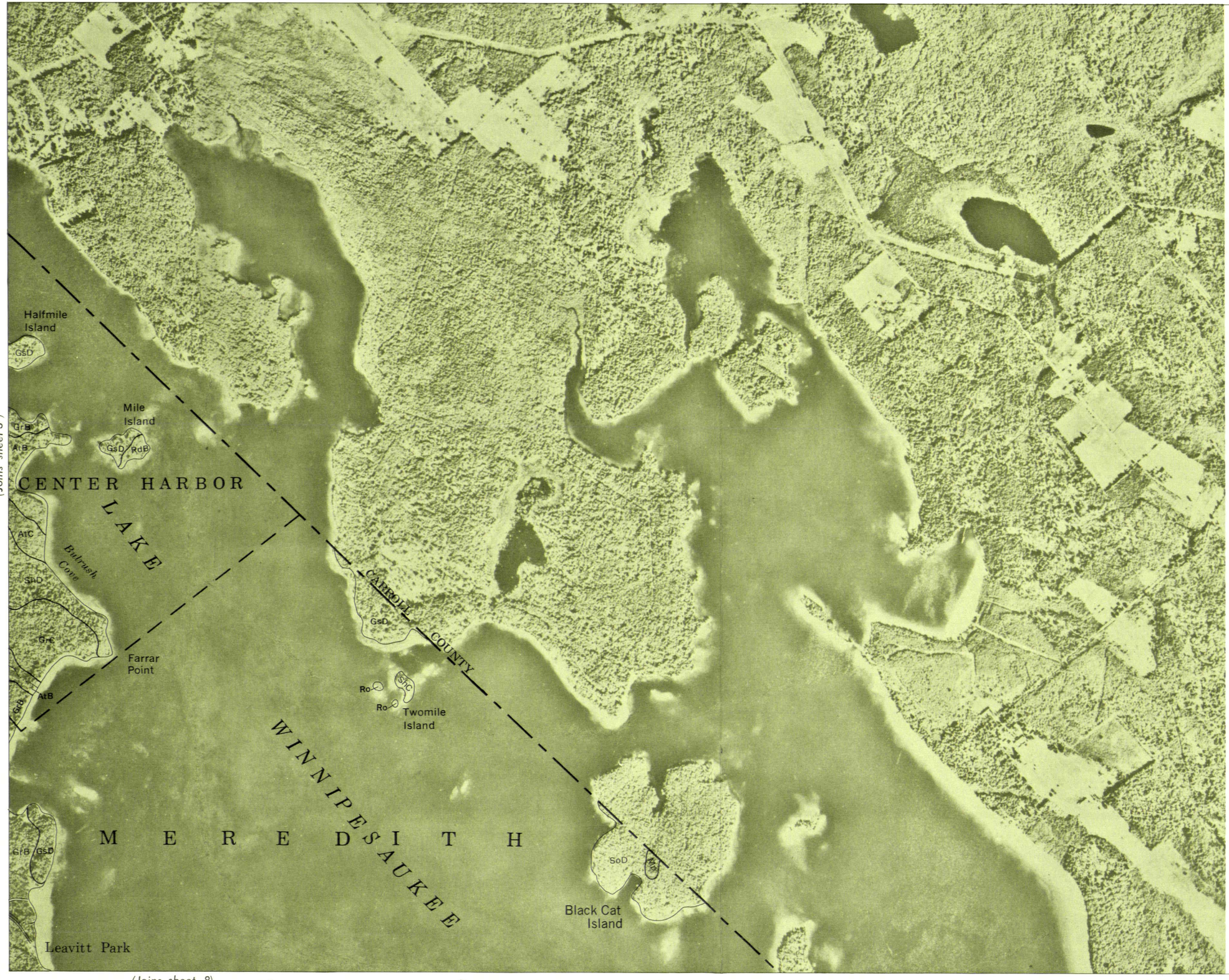
0 5000 Feet

This map is one of a set compiled in 1966 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the New Hampshire Agricultural Experiment Station.

BELKNAP COUNTY, NEW HAMPSHIRE NO. 39

4

N



(Joins sheet 3)

(Joins sheet 8)

0 ½ 1 Mile

Scale 1:15840

0 5 000 Feet

BELKNAP COUNTY, NEW HAMPSHIRE NO. 4

(40)

N

(Joins sheet 33)

(Joins sheet 39)

(Joins sheet 41)

(Joins sheet 47)

ALTON BAY

Loon Cove

Sandy Point

Pine Mountain

Camp Avenchur

Alton Bay

Avery Hill

Hills Pond

Sunset Lake

Watson Brook

Mill Brook

Prohoch Brook

Scale 1:15840

0 ½ 1 Mile

0 5000 Feet

BELKNAP COUNTY, NEW HAMPSHIRE NO. 40

(Joins sheet 34)

(Joins sheet 40)

(Joins sheet 48)

N

ALTON

Bear Pond

Alton Bay

STRAFFORD COUNTY

Scale 1:15 840

0 ½ 1 Mile

0 5000 Feet

N

(Joins sheet 20)

(Joins sheet 28)

(Joins sheet 35)

(Joins sheet 43)

0 ½ 1 Mile

Scale 1:15 840

0 5 000 Feet

(Joins sheet 36)

(Joins sheet 42)

(Joins sheet 44)

0 ½ 1 Mile Scale 1: 15 840 0 5 000 Feet

This map is one of a set compiled in 1966 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the New Hampshire Agricultural Experiment Station.

(Joins sheet 37)

(Joins sheet 43)

B E L M O N T

Belmont

Badger Pond

Pout Pond

Tioga River

Winnipesaukee River

Tioga Brook

MERRIMACK COUNTY

(Joins sheet 45)

(Joins sheet 49)

Scale 1: 15 840

0 ½ 1 Mile

0 5 000 Feet

(Joins sheet 38)

45

N

(Joins sheet 44)

(Joins sheet 46)

(Joins sheet 50)

BELMONT

GILMANTON

Lamprey Hill

Bradford Hill

Peaked Hill

Gilmanton

Sargent Reservoir

Sawyer Lake

Badger Brook

Varney Brook

0 ½ 1 Mile

Scale 1:15 840

0 5 000 Feet

This map is one of a set compiled in 1966 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the New Hampshire Agricultural Experiment Station.

BELKNAP COUNTY, NEW HAMPSHIRE NO. 45

46

N

(Joins sheet 39)

(Joins sheet 45)

(Joins sheet 47)

(Joins sheet 51)

GILMANTON

Coswell

Mountain

CRYSTAL LAKE

Nashawtuck Hollow

Murray Brook

0 ½ 1 Mile Scale 1:15840 0 5,000 Feet

(Joins sheet 40)
(Joins sheet 46)
(Joins sheet 48)
(Joins sheet 52)

47

N

ALTON

GILMANTON

Rocky Mountain

Halls Hill

CRYSTAL LAKE

RIVER

SUNCOOK

Scale 1:15840

0 ½ 1 Mile

0 5000 Feet

(Joins sheet 47)

N

Alton

MERRYMEETING RIVER

Marsh Pond

STRAFFORD COUNTY

COFFIN R.

RhB

(Joins sheet 47)

(Joins sheet 53)

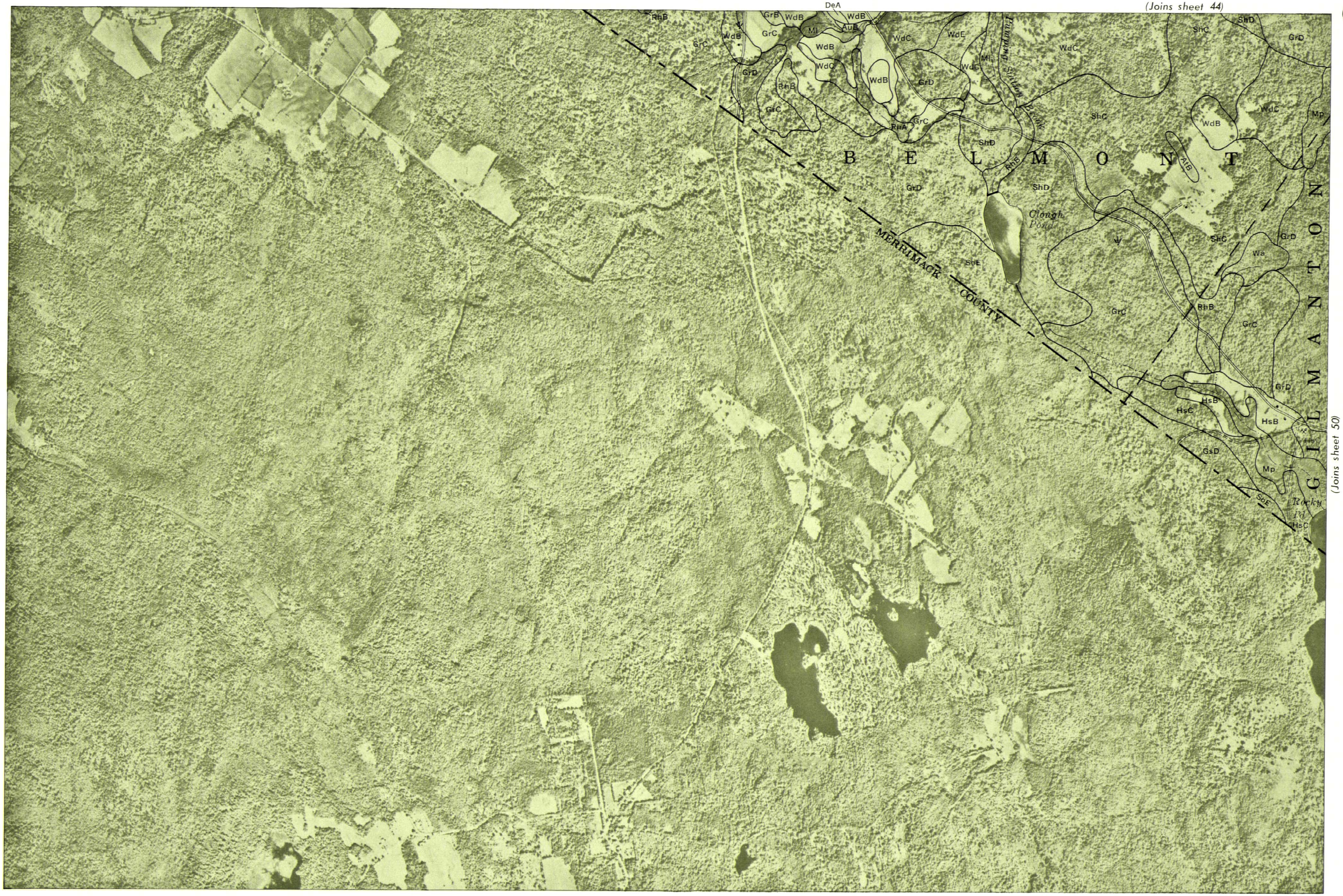
0 ½ 1 Mile

Scale 1:15 840

0 5 000 Feet

(Joins sheet 44)

49



(Joins sheet 50)

0 ½ 1 Mile Scale 1: 15840 0 5000 Feet

This map is one of a set compiled in 1966 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the New Hampshire Agricultural Experiment Station.

(Joins inset, sheet 2)

(Joins sheet 6)

(Joins sheet 9)

This map is one of a set compiled in 1966 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the New Hampshire Agricultural Experiment Station.

BELKNAP COUNTY, NEW HAMPSHIRE NO. 5

Scale 1:15 840

0 ½ 1 Mile

0 5 000 Feet

50

N

(Joins sheet 45)

(Joins sheet 49)

(Joins sheet 51)

PnC (Joins sheet 54)

BELMONT

Gilmanton

Peaked Hill

MEADOW POND STATE FOREST

G I L M A N T O N

Kimball

Allens Mills

Pond

Shellcamp

Rocky Pond

MERRIMACK COUNTY

Badger

Loon Pond

0 ½ 1 Mile

Scale 1:15840

0 5000 Feet

BELKNAP COUNTY, NEW HAMPSHIRE NO.50

(Joins sheet 46)
(Joins sheet 50)
(Joins sheet 52)
(Joins sheet 55)

51

N

Smith Meetinghouse
Parsonage Hill
Meeting House Pond
Loon Pond
Varney Brook
Nighthawk Brook
Holtzer Brook
Ayers Brook
Garrett Brook
Loon Pond Brook
GILMANTON HILL

0 ½ 1 Mile
Scale 1:15840
0 5000 Feet

(Joins sheet 47)

52

N

G I L M A N T O N

SUNCOOK

Gilmanton Ironworks

PINEGROVE CEMETERY

Camp Fatima

B A R N S T E A D

UPPER SUNCOOK LAKE

A L T O N

Halfmoon Lake

(Joins sheet 51)

(Joins sheet 53)

(Joins sheet 56)

0 ½ 1 Mile

Scale 1:15 840

0 5,000 Feet

BELKNAP COUNTY, NEW HAMPSHIRE NO. 52

(Joins sheet 48)

(Joins sheet 52)

(Joins sheet 57)

53

N

Stockbridge Corners

Prospect Mountain

Ragged Mountain

Camp Mi Ta Na

Halfmoon Lake

A L T O N

BARNSTEAD

STRAFFORD COUNTY

COFFIN BROOK

0 ½ 1 Mile

Scale 1: 15840

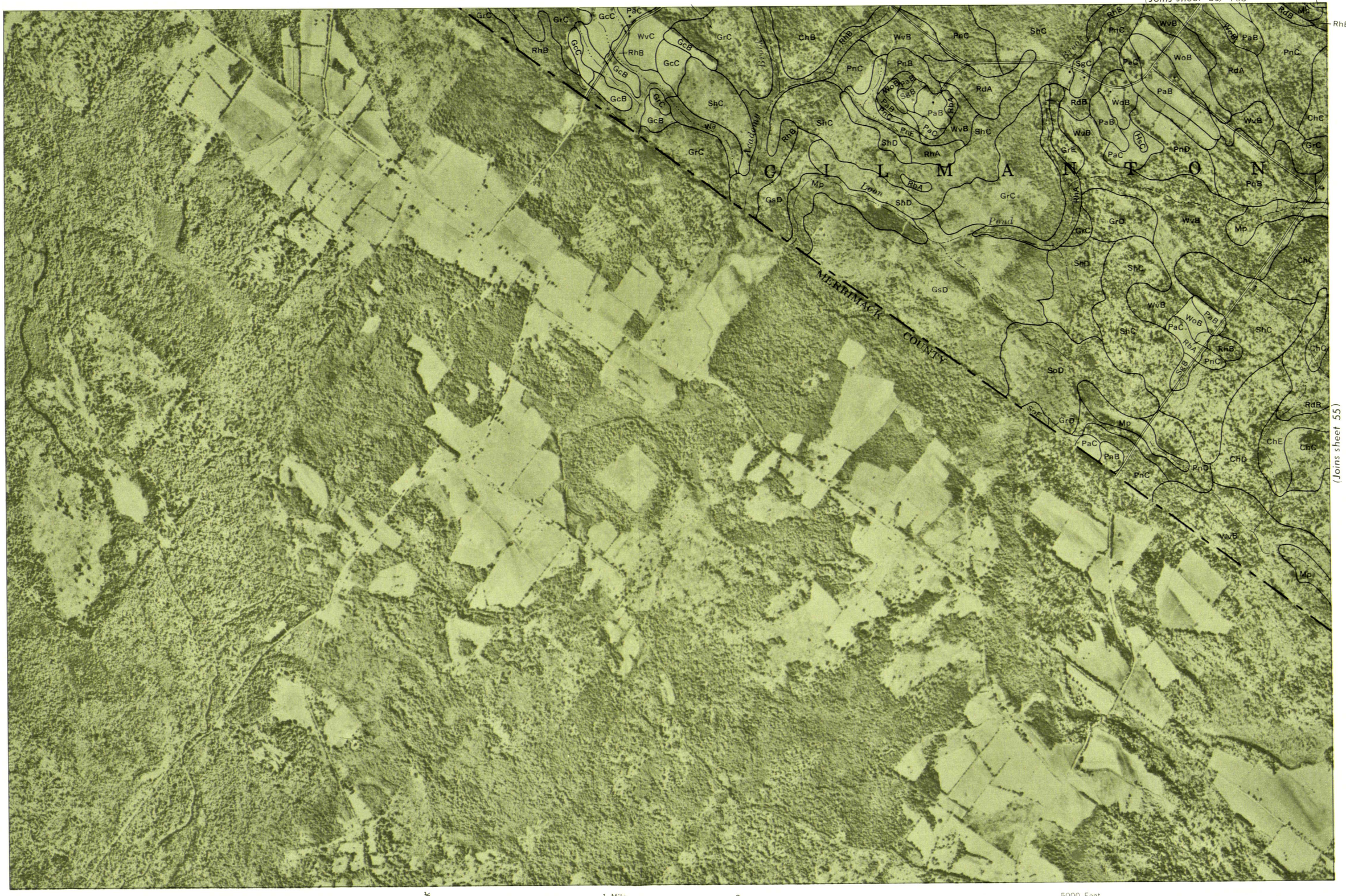
0 5000 Feet

This map is one of a set compiled in 1966 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the New Hampshire Agricultural Experiment Station.

BELKNAP COUNTY, NEW HAMPSHIRE NO. 53

54

N



0 ½ 1 Mile

Scale 1: 15 840

0 5000 Feet

BELKNAP COUNTY, NEW HAMPSHIRE NO.54

(Joins sheet 51)

(Joins sheet 54)

(Joins sheet 56)

(Joins sheet 58)

N

Lower Gilmanton

GILMANTON

Kelleys Corner

Sanborn Hill

Rollins Pond

Kelley Brook

BARNSTEAD

Lougee Pond

Beauty Hill

Wheeler Brook

MERRIMACK COUNTY

0 ½ 1 Mile

Scale 1: 15840

0 5000 Feet

56

(Joins sheet 52)

N

UPPER SUNCOOK LAKE

LOWER SUNCOOK LAKE

BARNSTEAD

Halfmoon Lake

Stream

Webster

Suncook River

Beauty Hill

Brindle Pond

Huntress Pond

Shackford Corners

(Joins sheet 55)

(Joins sheet 57)

(Joins sheet 59)

0 ½ 1 Mile

Scale 1:15 840

0 5000 Feet

BELKNAP COUNTY, NEW HAMPSHIRE NO.56

(Joins sheet 53)

(Joins sheet 56)

(Joins sheet 60)

N

Halfmoon Lake

North Barnstead

Locke's Corner

Drews Hill

STRAFFORD COUNTY

A L T O N

B A R N S T E A D

Scale 1:15840

0 ½ 1 Mile

0 5000 Feet

This map is one of a set compiled in 1966 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the New Hampshire Agricultural Experiment Station.

BELKNAP COUNTY, NEW HAMPSHIRE NO. 57

N

(Joins sheet 55)

GILMANTON

BARNSTEAD

MERRIMACK COUNTY

Lily Lake

Kelley Brook

Brook

Wheeler Brook

(Joins sheet 59)

0 ½ 1 Mile

Scale 1:15840

0 5000 Feet

This map is one of a set compiled in 1966 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the New Hampshire Agricultural Experiment Station.

(Joins sheet 56)

(Joins sheet 58)

(Joins sheet 60)

(Joins sheet 61)

59

N

BARNSTEAD

Center Barnstead

Barnstead

Huntress Pond

Suncook River

Crooked Run

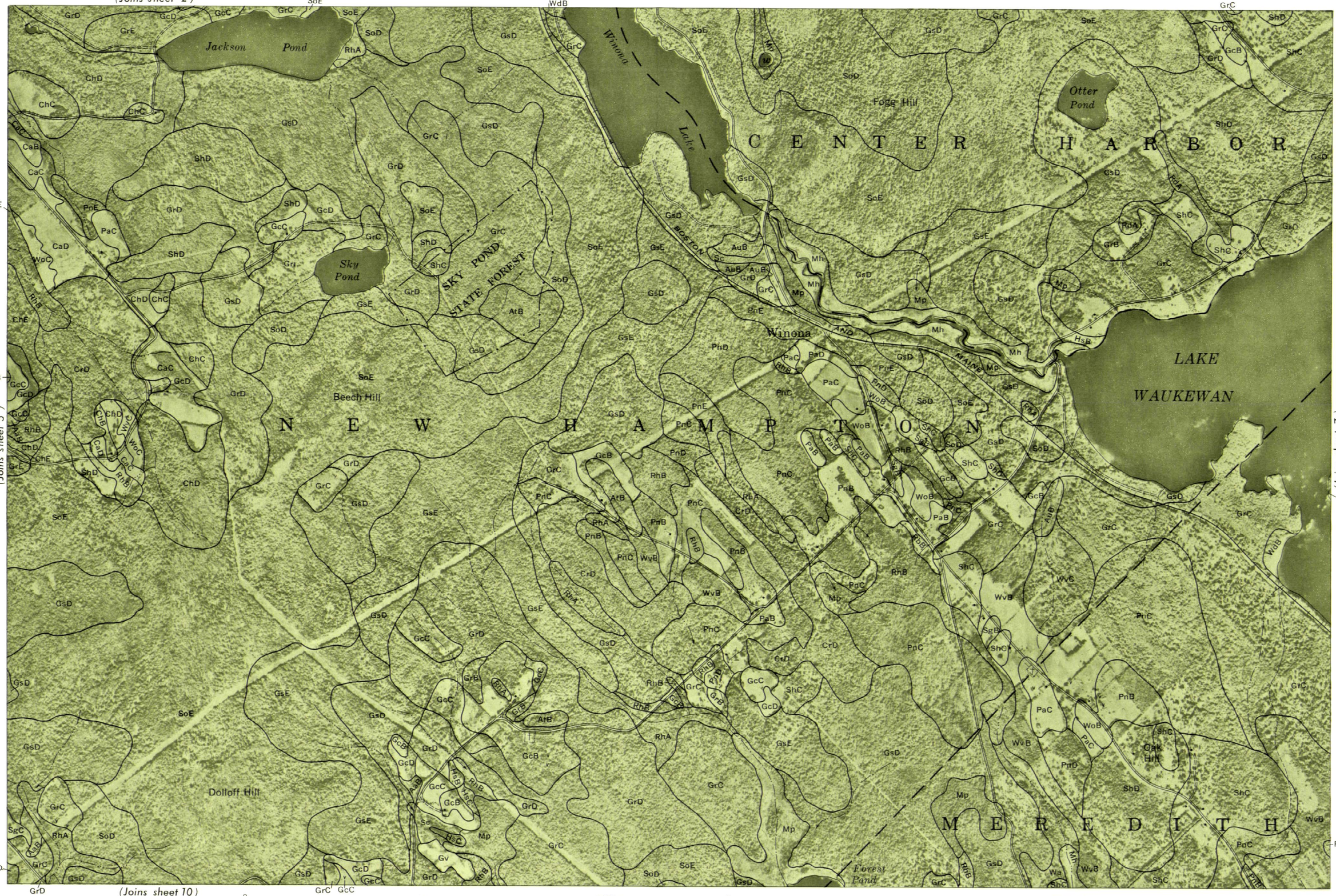
Merrimack County

Scale 1:15840

0 ½ 1 Mile

0 5,000 Feet

6



0 ½ 1 Mile

Scale 1:15840

0 5000 Feet

60

(Joins sheet 57)

N

(Joins sheet 59)

B A R N S T E A D

Big Little River

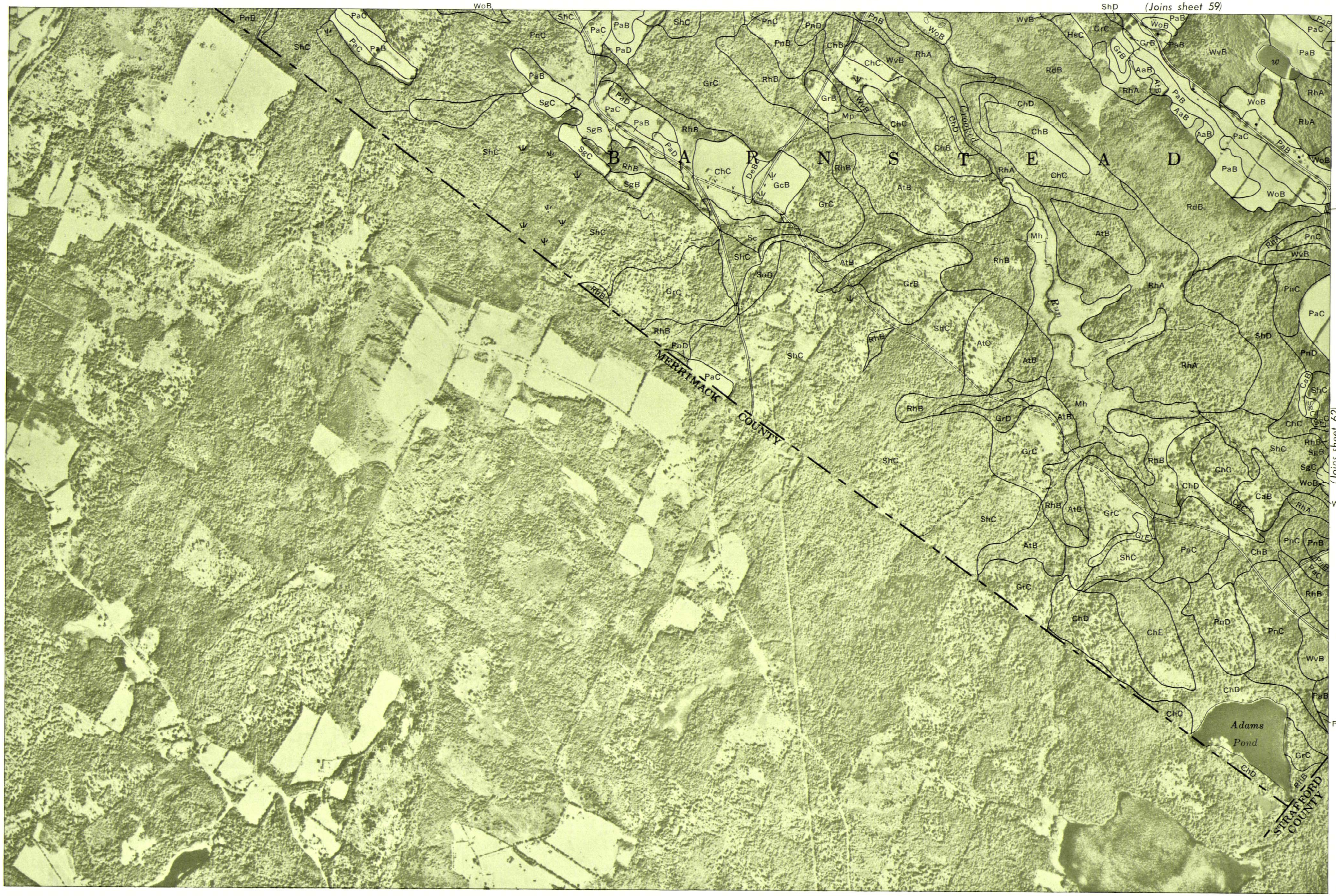
STRAFFORD COUNTY

(Joins sheet 62)

Scale 1:15 840

0 ½ 0 5000 Feet

BELKNAP COUNTY, NEW HAMPSHIRE NO.60



0 ½ 1 Mile Scale 1:15 840 0 5 000 Feet

This map is one of a set compiled in 1966 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the New Hampshire Agricultural Experiment Station.

62

N

(Joins sheet 60)

(Joins sheet 61)

South Barnstead

B A R N S T E A D

STRAFFORD COUNTY

Scale 1:15840

0 ½ 1 Mile

0 5000 Feet

BELKNAP COUNTY, NEW HAMPSHIRE NO.62

This map is one of a set compiled in 1966 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the New Hampshire Agricultural Experiment Station.
BELKNAP COUNTY, NEW HAMPSHIRE NO. 7

(Joins sheet 3)
(Joins sheet 6)
(Joins sheet 8)
(Joins sheet 11)

CENTER HARBOR
NEW HAMPTON
Chapman Island
LAKE WAUKEWAN
Meredith
MEREDITH BAY
MEREDITH NECK
Little Pond
QUARRY
Pinnacle Hill
CEMETERY
BOSTON MINE
MAINE
Scale 1:15 840
0 ½ 1 Mile
0 5000 Feet
N

(Joins sheet 4)

N

Hornets Nest Point

Beaver Island

Threemile Island

Hawks Nest Island

LAKE WINNIPESAUKEE

CARROLL COUNTY

Millstone Hill

Advent Cove

Pine Island

ALVORD WILDLIFE SANCTUARY

Bear Island

Fivemile Island

Loon Island

Kelley Cove

MEREDITH

Lovejoy Sands

The Gulf

Bear Island

Jerry Point

Sixmile Island

East Bear Island

Fish Cove

Meredith Neck

Paine Brook

Mill Brook

Mill Brook

(Joins sheet 7)

(Joins sheet 12)

(Joins inset, sheet 13)

0 ½ 1 Mile

Scale 1:15840

0 5,000 Feet

BELKNAP COUNTY, NEW HAMPSHIRE NO.8

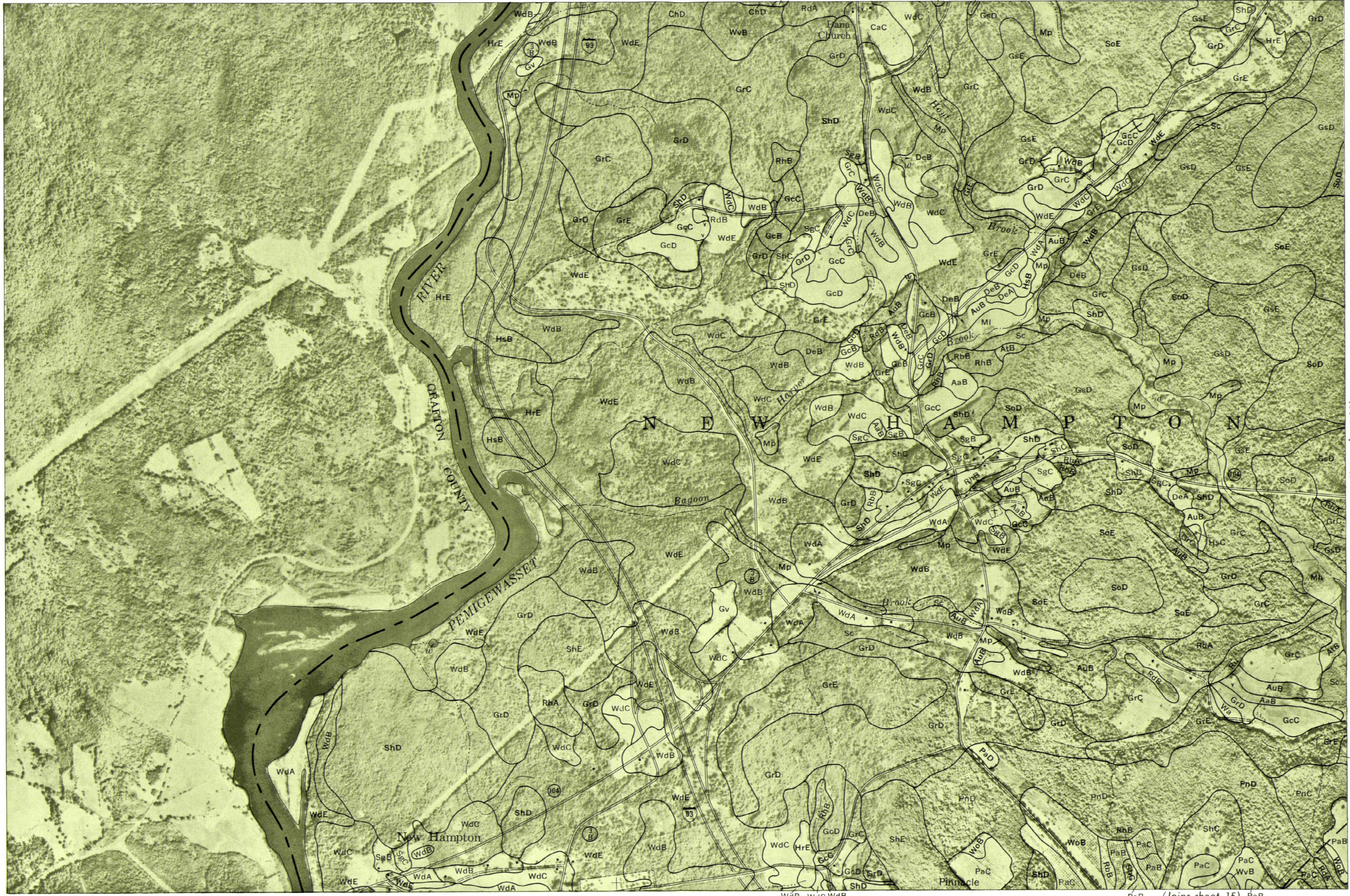
(Joins sheet 5)

9

This map is one of a set compiled in 1966 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the New Hampshire Agricultural Experiment Station.

BELKNAP COUNTY, NEW HAMPSHIRE NO. 9

N



(Joins sheet 10)

0 ½ 1 Mile Scale 1:15 840 0 5 000 Feet

(Joins sheet 15)

GUIDE TO MAPPING UNITS

[For a full description of a mapping unit, read both the description of the mapping unit and the description of the soil series to which the mapping unit belongs.

[See table 1, page 5, for approximate acreage and proportionate extent of the soils; table 2, page 28, for estimated yields per acre of the principal crops; and table 3, page 30, for information about woodland. For facts about soils used in engineering, as recreation sites, and in community development, turn to the sections beginning on pages 38, 48, and 49, respectively]

Map symbol	Mapping unit	Described on page	Capability unit	
			Symbol	Page
AaB	Acton and Acton firm substratum, fine sandy loams, 0 to 8 percent slopes	6	IIw-52	22
AtB	Acton and Acton firm substratum, very stony fine sandy loams, 0 to 8 percent slopes	6	VIs-72	26
AtC	Acton and Acton firm substratum, very stony fine sandy loams, 8 to 15 percent slopes	6	VIs-72	26
AuB	Au Gres loamy sand, 0 to 8 percent slopes	7	IIIw-23	24
CaB	Charlton loam, 3 to 8 percent slopes	7	IIe-5	22
CaC	Charlton loam, 8 to 15 percent slopes	7	IIIe-5	23
CaD	Charlton loam, 15 to 25 percent slopes	7	IVe-5	25
ChB	Charlton very stony loam, 3 to 8 percent slopes	7	VIs-7	25
ChC	Charlton very stony loam, 8 to 15 percent slopes	7	VIs-7	25
ChD	Charlton very stony loam, 15 to 25 percent slopes	8	VIs-7	25
ChE	Charlton very stony loam, 25 to 60 percent slopes	8	VIIs-7	27
CrD	Charlton extremely stony loam, 8 to 25 percent slopes	8	VIIs-58	27
CrE	Charlton extremely stony loam, 25 to 60 percent slopes	8	VIIs-58	27
DeA	Deerfield loamy sand, 0 to 3 percent slopes	8	IIw-22	22
DeB	Deerfield loamy sand, 3 to 8 percent slopes	8	IIw-22	22
GcB	Gloucester sandy loam, 3 to 8 percent slopes	9	IIs-55	23
GcC	Gloucester sandy loam, 8 to 15 percent slopes	9	IIIe-55	23
GcD	Gloucester sandy loam, 15 to 25 percent slopes	9	IVe-55	25
GrB	Gloucester very stony sandy loam, 3 to 8 percent slopes	9	VIs-7	25
GrC	Gloucester very stony sandy loam, 8 to 15 percent slopes	9	VIs-7	25
GrD	Gloucester very stony sandy loam, 15 to 25 percent slopes	9	VIs-7	25
GrE	Gloucester very stony sandy loam, 25 to 60 percent slopes	10	VIIs-7	27
GsD	Gloucester extremely stony sandy loam, 8 to 25 percent slopes	10	VIIs-58	27
GsE	Gloucester extremely stony sandy loam, 25 to 60 percent slopes	10	VIIs-58	27
Gv	Gravel and Borrow pits (not in a capability unit)	10	-------	--
HrE	Hinckley gravelly loamy sand, 15 to 60 percent slopes	10	VIIs-27	27
HsA	Hinckley loamy sand, 0 to 3 percent slopes	10	IIIs-26	25
HsB	Hinckley loamy sand, 3 to 8 percent slopes	11	IIIs-26	25
HsC	Hinckley loamy sand, 8 to 15 percent slopes	11	IVs-26	25
Ma	Made land (not in a capability unit)	11	-------	--
Mh	Marsh	11	VIIIw-89	27
Ml	Mixed alluvial land, wet	11	VIIw-14	26
Mp	Muck and Peat (not in a capability unit)	11	-------	--
Oh	Ondawa fine sandy loam, high bottom	12	I-1	21
PaB	Paxton loam, 0 to 8 percent slopes	13	IIe-6	22
PaC	Paxton loam, 8 to 15 percent slopes	13	IIIe-6	23
PaD	Paxton loam, 15 to 25 percent slopes	13	IVe-6	25
PnB	Paxton very stony loam, 3 to 8 percent slopes	13	VIs-7	25
PnC	Paxton very stony loam, 8 to 15 percent slopes	13	VIs-7	25
PnD	Paxton very stony loam, 15 to 25 percent slopes	13	VIs-7	25
PnE	Paxton very stony loam, 25 to 60 percent slopes	13	VIIs-7	27
Po	Podunk fine sandy loam	14	IIw-12	22
RbA	Ridgebury loam, 0 to 3 percent slopes	15	IIIw-63	24
RbB	Ridgebury loam, 3 to 8 percent slopes	15	IIIw-63	24
RdA	Ridgebury very stony loam, 0 to 3 percent slopes	15	VIIs-73	27
RdB	Ridgebury very stony loam, 3 to 8 percent slopes	15	VIIs-73	27
RhA	Ridgebury and Whitman very stony loams, 0 to 3 percent slopes	15	VIIs-74	27
RhB	Ridgebury and Whitman very stony loams, 3 to 8 percent slopes	15	VIIs-74	27
Ro	Rock outcrop	15	VIIIs-90	27
Ru	Rumney fine sandy loam	16	IIIw-13	23
Sc	Scarboro fine sandy loam	16	Vw-24	25
SgB	Shapleigh-Gloucester sandy loams, 3 to 8 percent slopes	16	IIe-56	22
SgC	Shapleigh-Gloucester sandy loams, 8 to 15 percent slopes	17	IIIe-56	23
ShC	Shapleigh-Gloucester very rocky sandy loams, 3 to 15 percent slopes	17	VIs-57	26
ShD	Shapleigh-Gloucester very rocky sandy loams, 15 to 25 percent slopes	17	VIs-57	26
ShE	Shapleigh-Gloucester very rocky sandy loams, 25 to 60 percent slopes	17	VIIs-57	27
SoD	Shapleigh-Gloucester extremely rocky sandy loams, 8 to 25 percent slopes	17	VIIs-58	27
SoE	Shapleigh-Gloucester extremely rocky sandy loams, 25 to 60 percent slopes	17	VIIs-58	27
Sy	Suncook loamy sand	18	IIIs-16	25
Wa	Whitman very stony loam	18	VIIs-74	27
WdA	Windsor loamy sand, 0 to 3 percent slopes	19	IIIs-26	25
WdB	Windsor loamy sand, 3 to 8 percent slopes	19	IIIs-26	25
WdC	Windsor loamy sand, 8 to 15 percent slopes	19	IVs-26	25
WdE	Windsor loamy sand, 15 to 60 percent slopes	19	VIIs-26	27
WoB	Woodbridge loam, 0 to 8 percent slopes	20	IIw-62	23
WoC	Woodbridge loam, 8 to 15 percent slopes	20	IIIe-62	23
WvB	Woodbridge very stony loam, 0 to 8 percent slopes	20	VIs-72	26
WvC	Woodbridge very stony loam, 8 to 15 percent slopes	20	VIs-72	26

281-938 O - 68 (Face Maps)

SOIL LEGEND

The first capital letter is the initial one of the soil name. The second capital letter, A, B, C, D, or E shows the slope. Most symbols without a slope letter are for nearly level soils or land types, but some are for soils or land types that have considerable range in slope.

SYMBOL	NAME
AaB	Acton and Acton firm substratum, fine sandy loams, 0 to 8 percent slopes
AtB	Acton and Acton firm substratum, very stony fine sandy loams, 0 to 8 percent slopes
AtC	Acton and Acton firm substratum, very stony fine sandy loams, 8 to 15 percent slopes
AuB	Au Gres loamy sand, 0 to 8 percent slopes
CaB	Charlton loam, 3 to 8 percent slopes
CaC	Charlton loam, 8 to 15 percent slopes
CaD	Charlton loam, 15 to 25 percent slopes
ChB	Charlton very stony loam, 3 to 8 percent slopes
ChC	Charlton very stony loam, 8 to 15 percent slopes
ChD	Charlton very stony loam, 15 to 25 percent slopes
ChE	Charlton very stony loam, 25 to 60 percent slopes
CrD	Charlton extremely stony loam, 8 to 25 percent slopes
CrE	Charlton extremely stony loam, 25 to 60 percent slopes
DeA	Deerfield loamy sand, 0 to 3 percent slopes
DeB	Deerfield loamy sand, 3 to 8 percent slopes
GcB	Gloucester sandy loam, 3 to 8 percent slopes
GcC	Gloucester sandy loam, 8 to 15 percent slopes
GcD	Gloucester sandy loam, 15 to 25 percent slopes
GrB	Gloucester very stony sandy loam, 3 to 8 percent slopes
GrC	Gloucester very stony sandy loam, 8 to 15 percent slopes
GrD	Gloucester very stony sandy loam, 15 to 25 percent slopes
GrE	Gloucester very stony sandy loam, 25 to 60 percent slopes
GsD	Gloucester extremely stony sandy loam, 8 to 25 percent slopes
GsE	Gloucester extremely stony sandy loam, 25 to 60 percent slopes
Gv	Gravel and Borrow pits
HrE	Hinckley gravelly loamy sand, 15 to 60 percent slopes
HsA	Hinckley loamy sand, 0 to 3 percent slopes
HsB	Hinckley loamy sand, 3 to 8 percent slopes
HsC	Hinckley loamy sand, 8 to 15 percent slopes
Ma	Made land
Mh	Marsh
Ml	Mixed alluvial land, wet
Mp	Muck and Peat
Oh	Ondawa fine sandy loam, high bottom
PaB	Paxton loam, 0 to 8 percent slopes
PaC	Paxton loam, 8 to 15 percent slopes
PaD	Paxton loam, 15 to 25 percent slopes
PnB	Paxton very stony loam, 3 to 8 percent slopes
PnC	Paxton very stony loam, 8 to 15 percent slopes
PnD	Paxton very stony loam, 15 to 25 percent slopes
PnE	Paxton very stony loam, 25 to 60 percent slopes
Po	Podunk fine sandy loam
RbA	Ridgebury loam, 0 to 3 percent slopes
RbB	Ridgebury loam, 3 to 8 percent slopes
RdA	Ridgebury very stony loam, 0 to 3 percent slopes
RdB	Ridgebury very stony loam, 3 to 8 percent slopes
RhA	Ridgebury and Whitman very stony loams, 0 to 3 percent slopes
RhB	Ridgebury and Whitman very stony loams, 3 to 8 percent slopes
Ro	Rock outcrop
Ru	Rumney fine sandy loam
Sc	Scarboro fine sandy loam
SgB	Shapleigh–Gloucester sandy loams, 3 to 8 percent slopes
SgC	Shapleigh–Gloucester sandy loams, 8 to 15 percent slopes
ShC	Shapleigh–Gloucester very rocky sandy loams, 3 to 15 percent slopes
ShD	Shapleigh–Gloucester very rocky sandy loams, 15 to 25 percent slopes
ShE	Shapleigh–Gloucester very rocky sandy loams, 25 to 60 percent slopes
SoD	Shapleigh–Gloucester extremely rocky sandy loams, 8 to 25 percent slopes
SoE	Shapleigh–Gloucester extremely rocky sandy loams, 25 to 60 percent slopes
Sy	Suncook loamy sand
Wa	Whitman very stony loam
WdA	Windsor loamy sand, 0 to 3 percent slopes
WdB	Windsor loamy sand, 3 to 8 percent slopes
WdC	Windsor loamy sand, 8 to 15 percent slopes
WdE	Windsor loamy sand, 15 to 60 percent slopes
WoB	Woodbridge loam, 0 to 8 percent slopes
WoC	Woodbridge loam, 8 to 15 percent slopes
WvB	Woodbridge very stony loam, 0 to 8 percent slopes
WvC	Woodbridge very stony loam, 8 to 15 percent slopes

CONVENTIONAL SIGNS

WORKS AND STRUCTURES

Highways and roads
- Dual
- Good motor
- Poor motor
- Trail

Highway markers
- National Interstate
- U. S.
- State or county

Railroads
- Single track
- Multiple track
- Abandoned

Bridges and crossings
- Road
- Trail, foot
- Railroad
- Ferry (FY)
- Ford (FORD)
- Grade
- R. R. over
- R. R. under
- Tunnel

Buildings
- School
- Church
- Station

Mines and Quarries
- Mine dump
- Pits, gravel or other

Power line

Pipeline

Cemetery

Dams

Levee

Tanks

Well, oil or gas

BOUNDARIES

- National or state
- County
- Minor civil division
- Reservation
- Land grant
- Small park, cemetery, airport

DRAINAGE

Streams, double-line
- Perennial
- Intermittent

Streams, single-line
- Perennial
- Intermittent

Canals and ditches (CANAL)

Lakes and ponds
- Perennial (water, w)
- Intermittent

Wells, water (flowing)

Spring

Marsh or swamp

Wet spot

Alluvial fan

Drainage end

RELIEF

Escarpments
- Bedrock
- Other

Prominent peak

Depressions

	Large	Small
Crossable with tillage implements		
Not crossable with tillage implements		
Contains water most of the time		

SOIL SURVEY DATA

- Soil boundary and symbol (Dx)
- Gravel
- Stony, very stony
- Rock outcrops
- Chert fragments
- Clay spot
- Sand spot
- Gumbo or scabby spot
- Made land
- Severely eroded spot
- Blowout, wind erosion
- Gully

Soil map constructed 1966 by Cartographic Division, Soil Conservation Service, USDA, from 1953 aerial photographs. Controlled mosaic based on New Hampshire plane coordinate system, transverse Mercator projection, 1927 North American datum.